The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879

CLINTON S. DARLING, Editor
CHARLES A. BRESKIN, Adv. Mgr.
E. M. GIBSON, Asst. Mgr.
N. C. ROCKWOOD, Advisory Editor
H. E. HOPKINS, Associate Editor
C. H. FULLER, New York Rep.
GEO. P. MILLER, Manager

SUBSCRIPTION—Two dollars a year to United States and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies.

TO SUBSCRIBERS—Date on wrappers indicate issue with which your subscription expires. In writing to have address changed, give old as well as new address

Published Every Other Saturday by

Tradepress Publishing Corporation

542 South Dearborn Street, Chicago

Office New York Representative: 101 West 41st Street

MEMBER A. B. C. MEMBER A. B. P.

W. D. CALLENDER, President
N. C. ROCKWOOD, Vice-President
GEO. P. MILLER, Treasurer
C. O. NELSON, Secretary

Volume 25 July 1, 1922 Number 13

CONTENTS

A New York State Gravel Plant 13, 14
Crushed stone is so plentiful and so well established in New York that sand and gravel operations are few in comparison with other sections—But here is a new plant constructed to supply an important market in the interior of the state.

A Growing Labor Shortage 15

Washing Without Stripping 16, 17
Beder Wood's Sons Co., Moline, Ill., is handling successfully its deposit with a heavy overburden of top soil by double washing.

The Removal of Clay from Sand and Rock 19, 20
This tenth and concluding installment proves the author's assertion that "washed sand is a manufactured product"—It also shows that a plant may be overburdened by unnecessary equipment, which can be avoided if the needs of the product are studied before building the plant.

Putting New Jersey's Potash Marls on a Paying Basis 21, 22, 23, 24
How producers are planning to profit from the New Jersey marl deposits—This first installment traces the history of this material—Two other articles will follow.

Problems of the Fertilizer Industry 25

The Broken Year and How to Mend It 26, 27
The director of the U. S. Geological Survey says that the coal market must first be stabilized—He offers other wholesome advice of practical value.

Nothing to Sell But an Idea 28, 29
Some high lights which reflect the real purpose of the Portland Cement Association—Know as much as possible about the adaptability of the raw materials.

$190,000,000 for Road Construction 30

Developing California Gypsum 34, 35
A report by F. J. Griswold tells of its possibilities—It is planned to start soon the erection of a plant and railroad.

Hints and Helps 32, 33
Quarried from Life 36
Editorial 37
New Machinery and Equipment 38, 39
Rock Product Market 40, 41, 42, 43
Accident Prevention 44
News of All the Industry 45, 46

What Happens to a Magazine?

One of the editors entered the office of the Buffalo Crushed Stone Co. the other day. He was informed proudly that the company possessed practically a complete file of ROCK PRODUCTS, to which frequent reference was made. At the Buffalo Slag Co. the editor was told: "We receive copies of ROCK PRODUCTS at the office and after going through them we send them to the various plants." In the office of the president of a Buffalo sand producing concern the editor saw piled on a convenient table 40 or 50 copies of ROCK PRODUCTS—probably selected copies with articles of special interest or value to the company.

These three instances occurred unexpectedly, without solicitation, in the same office building on the same day. They are typical of the esteem with which ROCK PRODUCTS is regarded throughout the non-metallic mineral industries as the authoritative journal of the field.

For those readers who get from the magazine less than 100 per cent of its potential value there is a lesson here, too. Some types of fiction magazines are probably more valuable with the wrapper on than with it off, but unless ROCK PRODUCTS is opened, read, circulated through the organization, and saved for future reference, it is not rendering the full value it might.

The reference value is by no means the smallest. Often one recalls an article or an illustration that would help solve a plant problem, and so frequently the trouble of writing for a back copy, or the lack of such copy at the office, loses for you the idea which might have saved much trouble.

*

Keeping Pace with the Industry

From a desk in a large city office building it is impossible to edit a magazine of the nature of ROCK PRODUCTS and keep it filled with the livest and most up-to-date developments in the industry. The editors must be a great deal in the field where the actual accomplishments of the industry take place.

That is why ROCK PRODUCTS' editors spend a great deal of time and money in traveling and visiting the operations of the industry. And that is one of the important reasons why ROCK PRODUCTS has gained its place as the authoritative magazine of the industry.

Because the editors are always looking for all the news and all the latest developments, they are glad to hear from readers concerning anything of interest at their plants or connected in any way with the industry. If you are doing anything new, write to the editors.

*

Supplement Your Traveling

Progressive managers are those who go out looking for ideas. Two months in every 12 spent visiting other plants will make any man's plant better, and nothing can be substituted for it.

The best supplement to actual trips of inspection, however, is the reported results of continual trips of inspection made by the editors of a reputable and progressive magazine within the industry.

Those managers who get out most in the search for ideas are the ones who appreciate most the value of a magazine like ROCK PRODUCTS. They can't travel and see personally all they would like to—no one can—so they read ROCK PRODUCTS regularly and carefully in order not to miss any of the industry's developments.

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879

CLINTON S. DARLING, Editor
CHARLES A. BRESKIN, Adv. Mgr.
E. M. GIBSON, Asst. Mgr.
N. C. ROCKWOOD, Advisory Editor
H. E. HOPKINS, Associate Editor
C. H. FULLER, New York Rep.
GEO. P. MILLER, Manager

SUBSCRIPTION—Two dollars a year to United States and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies.

TO SUBSCRIBERS—Date on wrappers indicate issue with which your subscription expires. In writing to have address changed, give old as well as new address

Published Every Other Saturday by

Tradepress Publishing Corporation

542 South Dearborn Street, Chicago

Office New York Representative: 101 West 41st Street

MEMBER A. B. C. MEMBER A. B. P.

W. D. CALLENDER, President
N. C. ROCKWOOD, Vice-President
GEO. P. MILLER, Treasurer
C. O. NELSON, Secretary

Volume 25 July 1, 1922 Number 13

CONTENTS

A New York State Gravel Plant 13, 14
Crushed stone is so plentiful and so well established in New York that sand and gravel operations are few in comparison with other sections—But here is a new plant constructed to supply an important market in the interior of the state.

A Growing Labor Shortage 15

Washing Without Stripping 16, 17
Beder Wood's Sons Co., Moline, Ill., is handling successfully its deposit with a heavy overburden of top soil by double washing.

The Removal of Clay from Sand and Rock 19, 20
This tenth and concluding installment proves the author's assertion that "washed sand is a manufactured product"—It also shows that a plant may be overburdened by unnecessary equipment, which can be avoided if the needs of the product are studied before building the plant.

Putting New Jersey's Potash Marls on a Paying Basis 21, 22, 23, 24
How producers are planning to profit from the New Jersey marl deposits—This first installment traces the history of this material—Two other articles will follow.

Problems of the Fertilizer Industry 25

The Broken Year and How to Mend It 26, 27
The director of the U. S. Geological Survey says that the coal market must first be stabilized—He offers other wholesome advice of practical value.

Nothing to Sell But an Idea 28, 29
Some high lights which reflect the real purpose of the Portland Cement Association—Know as much as possible about the adaptability of the raw materials.

$190,000,000 for Road Construction 30

Developing California Gypsum 34, 35
A report by F. J. Griswold tells of its possibilities—It is planned to start soon the erection of a plant and railroad.

Hints and Helps 32, 33
Quarried from Life 36
Editorial 37
New Machinery and Equipment 38, 39
Rock Product Market 40, 41, 42, 43
Accident Prevention 44
News of All the Industry 45, 46

What Happens to a Magazine?

One of the editors entered the office of the Buffalo Crushed Stone Co. the other day. He was informed proudly that the company possessed practically a complete file of ROCK PRODUCTS, to which frequent reference was made. At the Buffalo Slag Co. the editor was told: "We receive copies of ROCK PRODUCTS at the office and after going through them we send them to the various plants." In the office of the president of a Buffalo sand producing concern the editor saw piled on a convenient table 40 or 50 copies of ROCK PRODUCTS—probably selected copies with articles of special interest or value to the company.

These three instances occurred unexpectedly, without solicitation, in the same office building on the same day. They are typical of the esteem with which ROCK PRODUCTS is regarded throughout the non-metallic mineral industries as the authoritative journal of the field.

For those readers who get from the magazine less than 100 per cent of its potential value there is a lesson here, too. Some types of fiction magazines are probably more valuable with the wrapper on than with it off, but unless ROCK PRODUCTS is opened, read, circulated through the organization, and saved for future reference, it is not rendering the full value it might.

The reference value is by no means the smallest. Often one recalls an article or an illustration that would help solve a plant problem, and so frequently the trouble of writing for a back copy, or the lack of such copy at the office, loses for you the idea which might have saved much trouble.

*

Keeping Pace with the Industry

From a desk in a large city office building it is impossible to edit a magazine of the nature of ROCK PRODUCTS and keep it filled with the livest and most up-to-date developments in the industry. The editors must be a great deal in the field where the actual accomplishments of the industry take place.

That is why ROCK PRODUCTS' editors spend a great deal of time and money in traveling and visiting the operations of the industry. And that is one of the important reasons why ROCK PRODUCTS has gained its place as the authoritative magazine of the industry.

Because the editors are always looking for all the news and all the latest developments, they are glad to hear from readers concerning anything of interest at their plants or connected in any way with the industry. If you are doing anything new, write to the editors.

*

Supplement Your Traveling

Progressive managers are those who go out looking for ideas. Two months in every 12 spent visiting other plants will make any man's plant better, and nothing can be substituted for it.

The best supplement to actual trips of inspection, however, is the reported results of continual trips of inspection made by the editors of a reputable and progressive magazine within the industry.

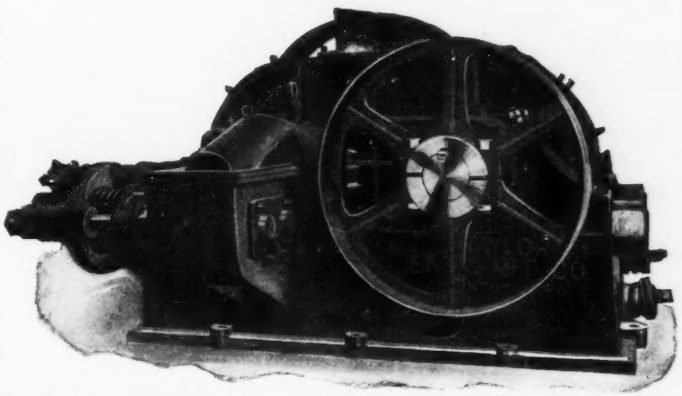
Those managers who get out most in the search for ideas are the ones who appreciate most the value of a magazine like ROCK PRODUCTS. They can't travel and see personally all they would like to—no one can—so they read ROCK PRODUCTS regularly and carefully in order not to miss any of the industry's developments.

ENDURINGLY EFFICIENT

Traylor Crushing Rolls

made their mark long ago in the mining industry, and mining engineers have ever been the most critical of any.

When others noticed the fact that TRAYLOR ROLLS were found wherever maximum efficiency was demanded their possibilities for other purposes than mining were investigated.



Now Rolls are used and valued in all industries where economical crushing is a factor—and, of the field, TRAYLOR ROLLS are the acknowledged leader.

TRAYLOR ROLLS are designed to meet the severe service demanded and, in general, are sturdy and wholly reliable in every way, but the particular feature which recommends them is the patented

FLEETING DEVICE

which prevents annular corrugation of shells and guarantees

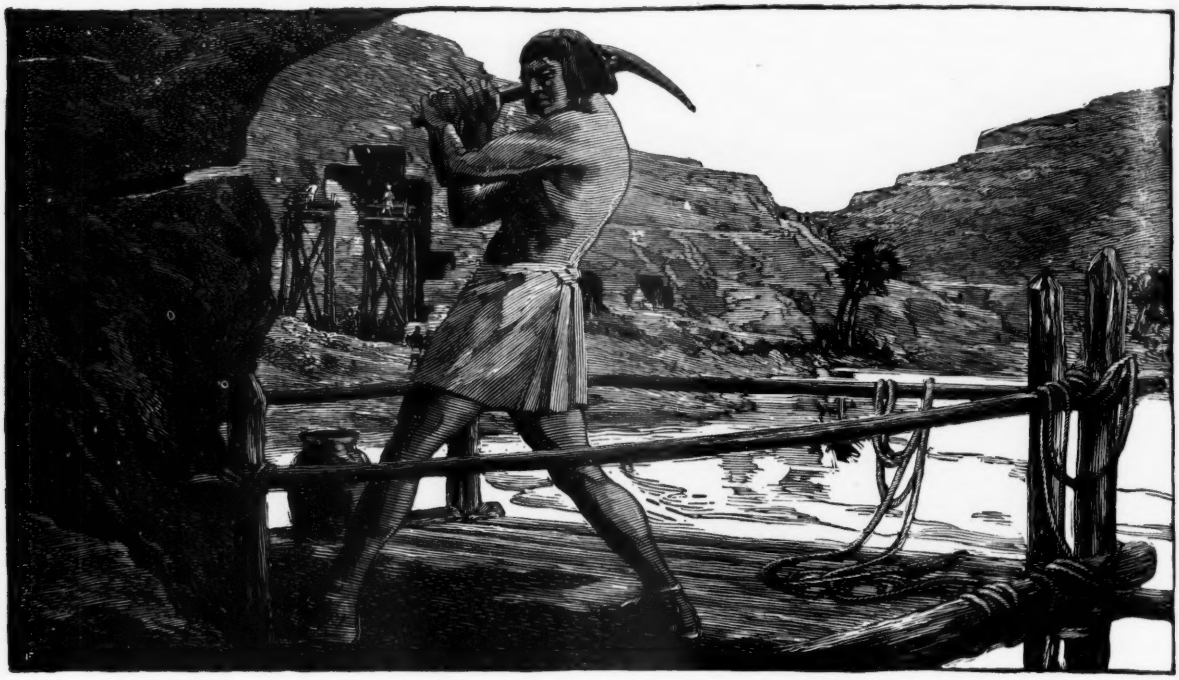
Lowest Steel Cost Per Ton of Product

YOUR COPY OF BULLETIN R2R IS WAITING YOUR REQUEST

TRAYLOR ENGINEERING AND MANUFACTURING COMPANY
ALLENTOWN, PA.

NEW YORK 30 Church St. | PITTSBURGH 1133 Fulton Bldg. | CHICAGO 1414 Fisher Bldg. | LOS ANGELES Citizens Nat. Bank Bldg. | SPOKANE 616 Mohawk Bldg.
BIRMINGHAM Brown-Marx Bldg. | NEW ORLEANS 1215 New Hibernia Bank Bldg. | SALT LAKE CITY 111 Dooly Bldg. | TIMMINS, ONT., CAN. Moore Block
TRUCK AND TRACTOR DIVISION, CORNWELLS, PENNA.

EXPORT DEPARTMENT, 104 PEARL ST., NEW YORK CITY. CABLE ADDRESS "FORSALTRA"
International Machy. Co. SANTIAGO, CHILE | W. R. Grace & Co. LIMA, PERU | International Machy. Co. RIO DE JANIERO, BRAZIL



The Ancient Quarries of Ptolemais

Like a gigantic staircase, the mountain of Gebel-Toukh slopes back from the waters of the Nile. Here, in the 4th century, B.C., Egyptians quarried stone for the streets and buildings of Ptolemais. One can still distinguish the grooves made by the tools of the workmen, and the instructions inscribed on the rock by the foremen.

When it became too costly to remove the overburden, subterranean quarries were started. The workman, on his raised platform, wielding a pointed tool, had no easy task in making the first cut for the roof in his system of "right-stepping".

Production at these quarries was insignificant compared with the enormous daily tonnages made possible by modern machinery and explosives. But conditions today which demand such large production also necessitate the prevention of waste in time, labor and materials. Now, even dynamite, one of man's greatest labor savers, must be scientifically selected.

On work for which it is suited, Hercules Special No. 1 reduces blasting costs. It contains about 35 percent more cartridges per box than 40 percent dynamite which it frequently replaces, cartridge for cartridge. For several years we have pointed out the economy of Hercules Special No. 1. It contains nothing but the highest grade of standard materials and by wide use at many quarries and mines has proved its dependability.

Our new book, "*Eliminating Waste in Blasting*", was written to assist you in reducing blasting costs. Write to our Advertising Department, 951 King St., Wilmington, Del., for a free copy.

HERCULES

POWDER COMPANY

Allentown, Pa. *Birmingham, Ala.* *Buffalo, N. Y.* *Chattanooga, Tenn.* *Chicago, Ill.* *Denver, Colo.* *Duluth, Minn.* *Hazleton, Pa.* *Huntington, W. Va.* *Joplin, Mo.* *Los Angeles, Cal.* *Louisville, Ky.* *New York City* *Norristown, Pa.* *Pittsburg, Kan.* *Pittsburgh, Pa.* *Pottsville, Pa.* *St. Louis, Mo.* *Salt Lake City, Utah* *San Francisco, Cal.* *Wilkesbarre, Pa.* *Wilmington, Del.*

When writing advertisers please mention ROCK PRODUCTS

1/3 more per dollar

THE DU PONT COMPANY leads the way in the production of more efficient and more economical explosives. In Dumorite, its latest achievement, it has made possible

a great step in the reduction of explosive costs

Dumorite is a new money-saving dynamite which gives you over ⅓ more work for your dollar—a guncotton-nitroglycerin dynamite without a headache—a non-freezing dynamite which can be used successfully at any temperature.

Dumorite has approximately the same strength as 40% dynamite and does the same work, stick for stick. And you can buy 135 to 140 sticks of Dumorite at the same price as 100 sticks of 40%.

Ask the du Pont Explosives Service Department through our nearest branch office how Dumorite can be used in your work. Ask that question in a letter outlining your requirements. Find out how this new development in explosives manufacture can cut your blasting costs for 1922.

Branch Offices:
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Chicago, Ill.
Denver, Colo.
Duluth, Minn.
Huntington, W. Va.
Kansas City, Mo.
New York, N. Y.
Pittsburgh, Pa.
Portland, Ore.
St. Louis, Mo.
San Francisco, Calif.
Scranton, Pa.
Seattle, Wash.
Spokane, Wash.
Springfield, Ill.
Du Pont Products Exhibit
Atlantic City, N. J.

E. I. du Pont de Nemours & Co., Inc.
Explosives Department, **Sales Division**
Wilmington, Delaware

NON-HEADACHE DU PONT NON-FREEZING

DUMORITE

THE "LAST WORD" IN EFFICIENT LOADING

YOUR loading problem should be a pleasant, simple and easy job—regardless of the kind of material handled.

The fastest modern method—the lowest cost per ton—the most uniformly satisfactory machine—all are yours if you use the new Link-Belt Power-Swiveling Loader.

Look at the illustrations. They show more than we can tell in words. See the machine at work and you will want it working for you.

The power-swiveling principle is correct. It needs no "attachments" or "frills" to help it dig. It is just a sturdy, powerful machine, into which we have built all of our experience. It is truly the "last word" in loader construction—backed by the entire Link-Belt engineering and manufacturing organization. Where is there a better guarantee.

Sooner or later you will load your material by machinery—therefore, reach your decision only after you have seen the Link-Belt Power-Swiveling Loader at work. Catalog, price and full particulars from nearest Link-Belt office.

LINK-BELT COMPANY

949

PHILADELPHIA

New York Woolworth Bldg.
Boston 9 49 Federal St.
Pittsburgh 1501 Park Bldg.
St. Louis Central National Bank Bldg.
Buffalo 547 Ellicott Square
Wilkes-Barre 2nd National Bank Bldg.
Huntington, W. Va. Robson-Prichard Bldg.
H. W. CALDWELL & SON CO.

CHICAGO

Cleveland 429 Kirby Bldg.
Detroit 4210 Woodward Ave.
Kansas City, Mo. 306 Elmhurst Bldg.
Seattle 820 First Ave., S.
Portland, Ore. 101 First St.
San Francisco 168 Second St.
Los Angeles 163 N. Los Angeles St.
CHICAGO, 17th and Western Ave.,
NEW YORK, Woolworth Bldg,

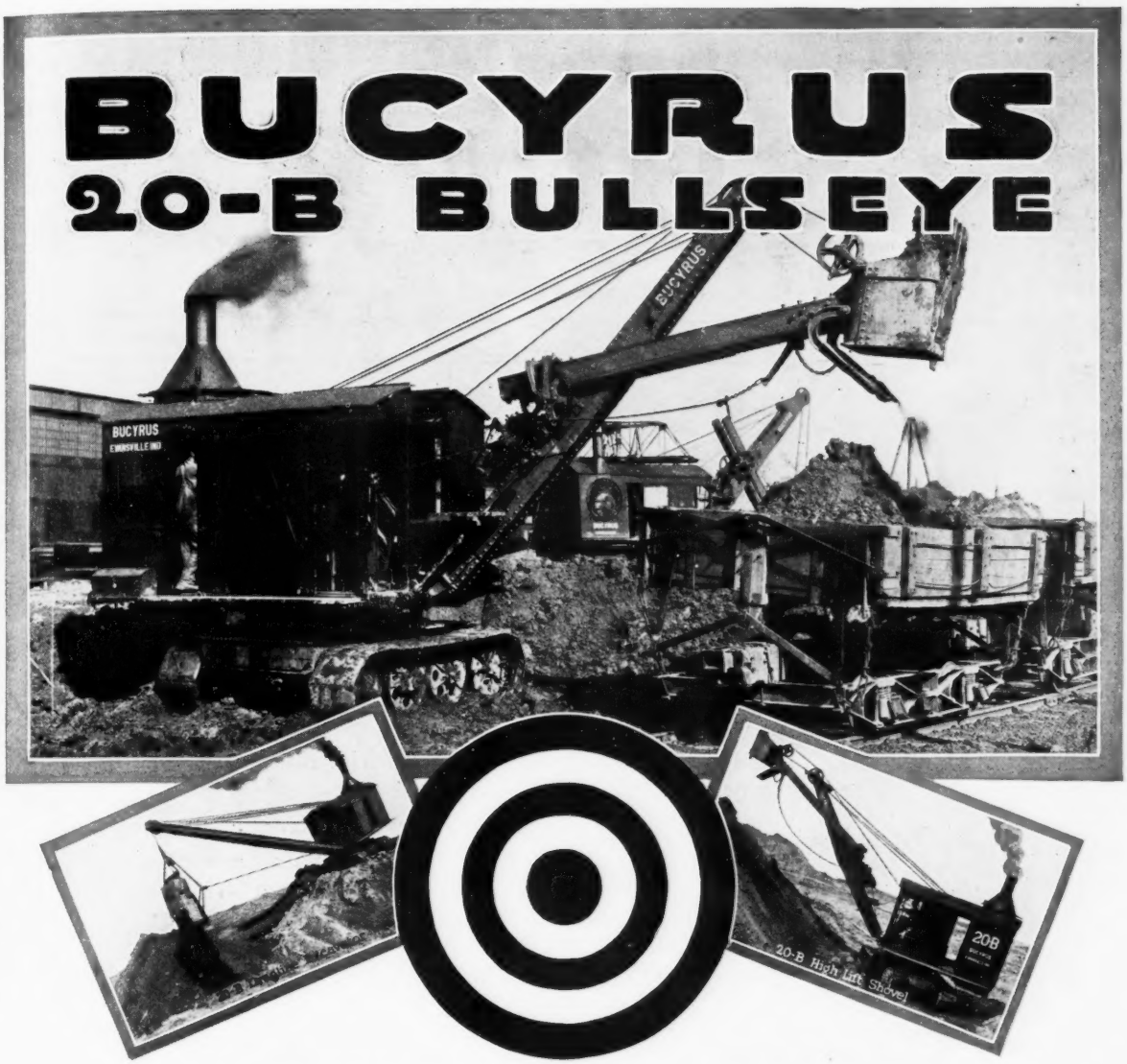
INDIANAPOLIS

Denver Lindrooth, Shubart & Co., Boston Bldg.
Louisville, Ky. Frederick Wehle, Starks Bldg.
New Orleans C. O. Hinz 504 Carondelet Bldg.
New Orleans Whitney Supply Co. Ltd. 418 S. Peters St.
Birmingham, Ala. S. L. Morrow, 720 Brown-Marx Bldg.
In Canada, Canadian Link-Belt Co., Ltd. Toronto & Montreal
DALLAS, TEXAS, 709 Main St.

LINK-BELT

When writing advertisers please mention ROCK PRODUCTS

BUCYRUS
20-B BULLSEYE



A NEW ¾-YARD SHOVEL

This is the machine you have been looking for. A Shovel built for the Shovelman. In designing this machine no detail has been too small to neglect which would make it easier to operate and more convenient for the operator.

Powerful, strong, fast, snappy, and yet light. Thoroughly tested by months of operation, under the severest of conditions, before being put on the market.

BUCYRUS

ESTABLISHED IN 1880

RAILROAD TYPE AND REVOLVING SHOVELS OF ALL SIZES-DRAGLINE EXCAVATORS-TRENCH EXCAVATORS-DIPPER, HYDRAULIC AND PLACER DREDGES, SPREADER PLOWS, WRECKING CRANES, ETC.

A SPECIAL PLANT DEVOTED EXCLUSIVELY TO SMALL REVOLVING SHOVELS

BUCYRUS COMPANY, SOUTH MILWAUKEE, WIS.

NEW YORK CHICAGO BIRMINGHAM SAN FRANCISCO PORTLAND DENVER

433

Clip this Coupon and Mail to Nearest Office

BUCYRUS COMPANY: Date_____
Please mail me your Bulletin C-201, describing your 20-B UNIVERSAL SHOVEL.
Name_____
Address_____
P

SHOPE BULLETIN

VOL. I July 1, 1922 Number 22

Brick Competition—

The prospective concrete brick manufacturers will probably be interested in knowing that an investment of $25,000 would be required to install and equip the smallest clay face brick plant and that the owner of such a plant is not guaranteed against competition as another clay brick plant can be installed on an adjacent or nearby site. This comparison is made because Shope brick licensees will have no competitors, in the assigned territory, operating another Shope plant or any other plant capable of turning out brick of Shope quality and appearance. Licensees are guaranteed against infringements during the full life of Shope patents.

There is a big demand for brick buildings. The market is waiting for Shope quality concrete brick. No other will meet with the same great measure of success. The greatest variety of facings and textures can only be obtained by using the Shope process and Shope equipment. In meeting the requirements of owner and architect quality, variety and quantity production must be taken into consideration. Shope brick can be supplied to suit any taste. Discriminating buyers will select Shope brick as was evidenced by the fact that the Portland Co-operative Labor Temple Association paid $8.25 more per 1000 for Shope face brick than the market price of clay face brick.

Get information concerning rights to manufacture this product. It is paying others and will pay you

Shope Brick Company

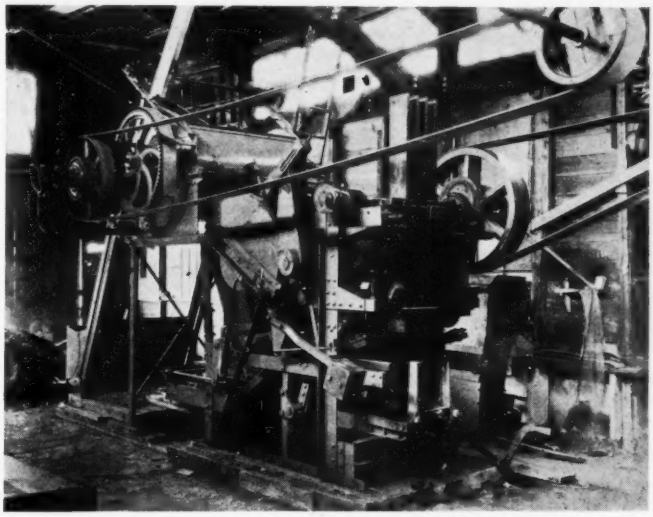
361 East Morrison Street **Portland, Oregon**

LICENSEES:

The Miles Co.----------Salem, Ore.
Eugene Concrete Co.----------Eugene, Ore.
Wastenburg Brick Co.----------Klamath Falls, Ore.
Arizona Shope Concrete Brick Co.----------Phoenix, Ariz.
Florida Nu-Tex Brick Co.----109 Water St., Tampa, Fla.
Texas Shope Brick Co.--3056 Sumpter Bldg., Dallas, Tex.
Birmingham Slag Co.----------Birmingham, Ala.
Shope Brick Co. of Wisconsin----------
----------50th and State Sts., Milwaukee, Wis.
The Polychrome Cement Brick & Tile Co.----------
----------Carter-Cotton Bldg., Vancouver, B. C.
Dark Canyon Stone Co., H. W. Jones, Mgr., Rapid City, S. D.
Warren Sand & Gravel Co.----------Easton, Pa.
Penn Shope Brick Co.----------Reading, Pa.
Lycoming Shope Brick Co.----------Williamsport, Pa.
Shope Brick Co.----------Portland, Ore.
Rustic Brick & Supply Co., Palette Rd., Ford City, Ont., Can.
Puyallup Shope Brick Co.----------Puyallup, Wash.
The Shope Brick Co.----------Springfield, Mass.
Utah Shope Brick Co., P. O. Box 632, Salt Lake City, Utah
Decoration Brick Co.--1565 N. Lake Ave., Seattle, Wash.

These licensees are all successful manufacturers

The BESSER



$100.00 a Day—Net

That's What This Machine Can Do for You

That is not a dream or an exaggeration. Such profits are being made right along—in many cases by people in ***your*** line of business, who are turning their piles of sand, gravel and reject into hard, fine, perfectly made concrete block, brick or tile with BESSER Automatic Concrete Products Machinery, We have letters to prove it.

There's a big market ***now*** for high grade concrete building units—and the demand is increasing each day. It doesn't take much argument for you to see the advantage and greater profit in selling a ***finished,*** manufactured article over the plain, raw material.

And in ***your*** case, the profits would be greater than in that of those who were starting fresh in the business, because the installation of an automatic BESSER machine for block, brick or tile won't add any to your overhead. Its purchase price is all you have to figure—and the machine soon pays for itself. The rest is profit.

Will you take that profit, or let someone else get it? That someone else may be writing us tomorrow. Why don't you write us TODAY?

BESSER SALES COMPANY

Complete Equipment for Concrete Products Plants

349 Monadnock Building **Chicago**

Better Own a BESSER *Than Compete With One*

NON-METALLIC MINERALS

The Function of an Engineer

—has as much to do with the prevention of projects of improbable commercial success, as it has to do with the designing and building of plants.

The true gauge of the success of an engineering organization should be, **what they do not do,** rather than what they do.

Our confidential clients' files hold many propositions which we have absolutely refused to handle, from an engineering standpoint.

There are reasons, and these reasons are your insurance against fallacious expansions or developments when dealing with this organization.

WALLER CROW, INC.
Engineers
COUNSELLORS IN INDUSTRIAL OPERATION & FINANCE
327 S. LA SALLE STREET • • CHICAGO

A Product of "K & J" Specialization in Quarry Cars—

Another type of quarry car designed and built by "K & J" Specialists in Quarry Car Construction.

This car is built to carry 94 cubic feet.

It is mounted on heavy spring bearings.

Axles turn in lead-lined brass bearings in 3″x6½″ journals.

It is of all steel construction with a 10′x7′x16″ bed.

Automatic couplers operating in coupler yoke.

Approximate weight, 6344 lbs.

A low, strong type of car so designed as to eliminate all parts subject to damage under the roughest use.

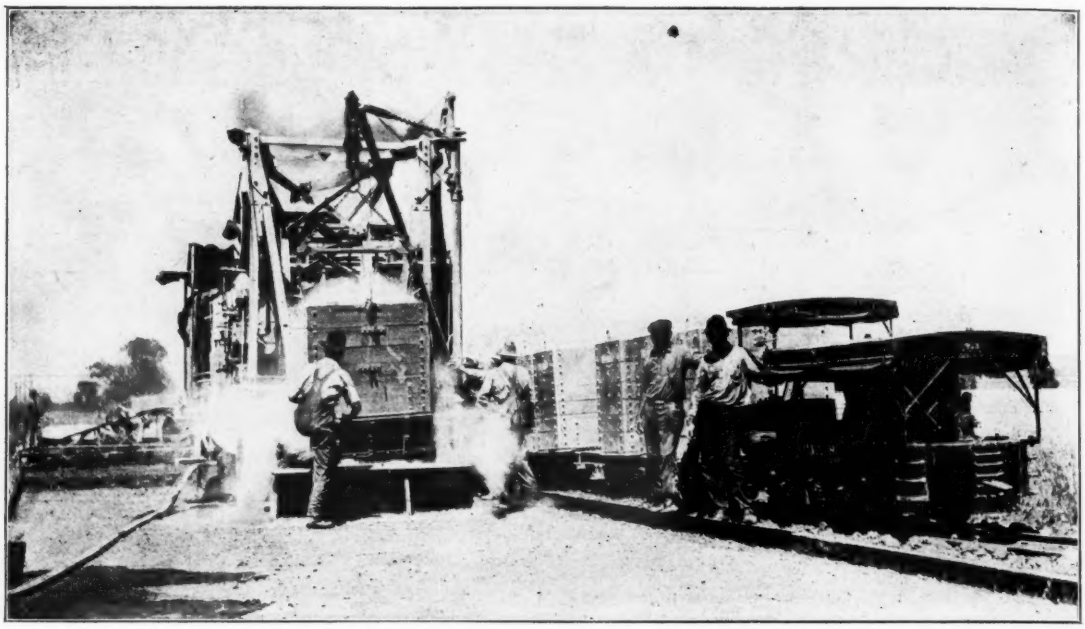
It takes specialized experience to design quarry cars.

Send for Catalog No. 530

The Kilbourne & Jacobs Mfg. Co.

Columbus, Ohio, U. S. A.

New York Office, 120 Broadway



One of Three PLYMOUTH Locomotives in Equipment of Cook-O'Brien Construction Co.

Plymouth Locomotive in "Show Me" State

When Cook-O'Brien Construction Co. built the St. Joe-Atchinson Road, Project No. 49, three PLYMOUTH Locomotives transported all materials from plant to mixer. Let Mr. F. H. Riebling tell the story of performance:

> "We are using three 3-ton PLYMOUTH Locomotives and they are giving entire satisfaction. The normal tonnage hauled by each unit is about 28 tons, equipment and materials. They are handling about 54 tons per hour, per locomotive, at a speed of six to nine miles per hour.
>
> "I have had previous experience with PLYMOUTH Locomotives, having used a fleet of six on concrete road construction during the past three seasons, all giving entire satisfaction."

There is no uncertain tone in the testimony of Mr. Riebling. Neither is there uncertain service in the PLYMOUTH. If you will tell us your haulage demands we will advise without expense to you.

THE FATE-ROOT-HEATH CO., Plymouth, Ohio

PLYMOUTH

Gasoline Locomotives

Rock Products

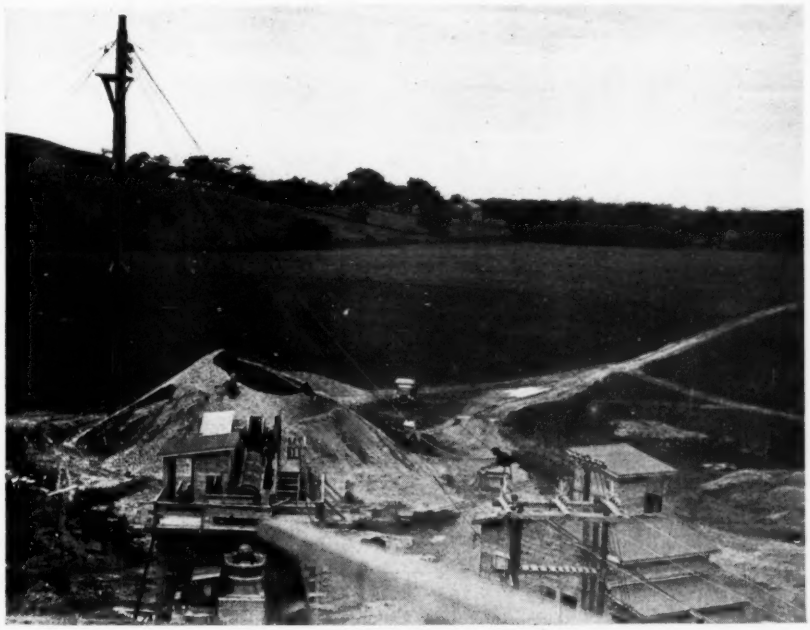
Volume XXV | Chicago, July 1, 1922 | Number 13

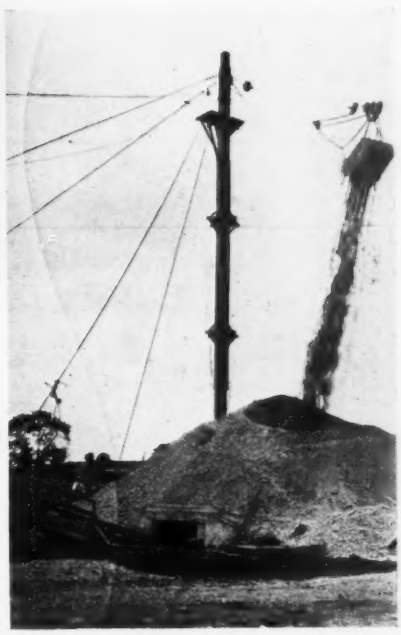
A New York State Gravel Plant

Crushed stone is so plentiful and so well established in New York state that sand and gravel operations are few in comparison with other sections. Here is a new plant, however, constructed to supply an important market in the interior of the state

A PLANT to supply Rochester and vicinity with 1000 tons daily of sand and gravel was started in operation about a month ago near Caledonia, N. Y., by the Continental Products Corp., of Rochester. There are still several places where the plant is not completed in its final form as originally planned, but the plant is in condition to operate and the first two weeks of production indicate that it will do all that was expected of it.

A dragline scraper dumping on the hopper over a tunnel, with a belt conveyor to a scalping screen and crusher, a second conveyor to a scrubber, washing screens, and three sand settlers, all discharging to ground-level sideless bins below which a loading belt runs in a tunnel and thence to the loading tracks, describe briefly the operation of this plant.





Under the storage pile at the left is the tunnel, with the initial belt which carries the gravel to the scalping screen and crusher. In the right-hand illustration is shown the head pulley of this belt, and below it the scalping screen and crusher as seen from the top of the screening house

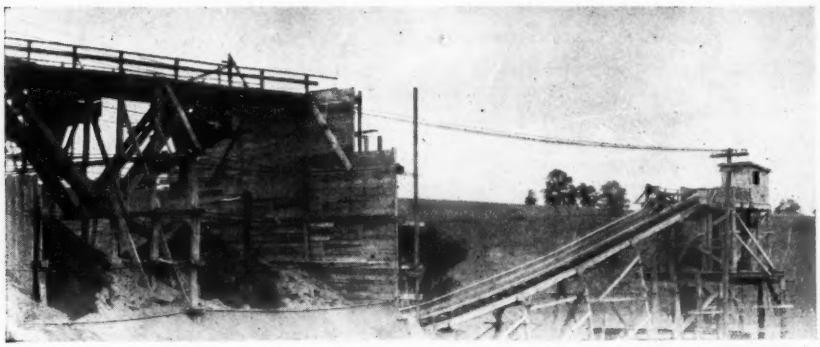
The deposit consists of about 180 acres of good gravel on a slightly rolling piece of ground. The loading tracks are along the lowest edge of the piece, and by taking advantage of this natural grade about 40 ft. of elevation is saved. The plant is located on the Lehigh Valley railroad about 18 miles from Rochester. Little stripping will be necessary on any part of the deposit.

Near the center of the deposit is a concrete tunnel 8 ft. wide, 7 ft. high, and 80 ft. long, the top of which is practically at grade. The dragline mast is erected near the tunnel, and can be moved around the tunnel so that the digging can be carried on anywhere within a radius of 500 ft.

The 1¾ yd. bucket of the Sauerman dragline dumps on the tunnel, in which is a hopper with automatic feeder delivering to a 24-in. rubber belt. This belt of 157 ft. centers, delivers the material

JUL 10 '24 OCT 17 '24

316372



Under the screens and sand separators are open storage bins, shown in the upper illustration. Below the bins is a tunnel with loading belt, shown in the lower illustration

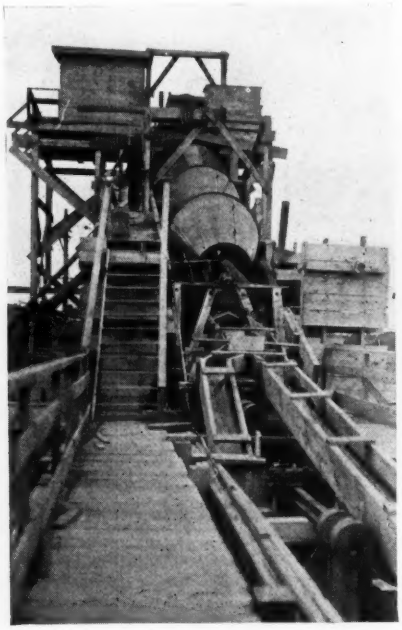
to a 3x12 ft. scalping screen with 1¾-in. perforations. The oversize goes to an 8-in. Traylor gyratory crusher directly below the discharge end of the screen, and the tailings from the crusher as well as the gravel passing the scalping screen pass to a second 24-in. rubber belt conveying to the washing plant. The belt delivers to a 5x8 ft. scrubber into which a 2-in. stream is directed, and under the head pulley of the belt is a spray directed against the belt which cleans it and washes any sticking sand or gravel into a trough and into the scrubber. From the scrubber the material empties successively into four conical Dull screens each 8 ft. long and 6 ft. and 3 ft. in diameter at the large and small ends. The first of these screens has two retarding rings to help in the process of washing and screening.

Three Link-Belt sand separators, each with a capacity of 500 gal. per minute, take two grades of sand from the wash water, mason's sand and concrete sand.

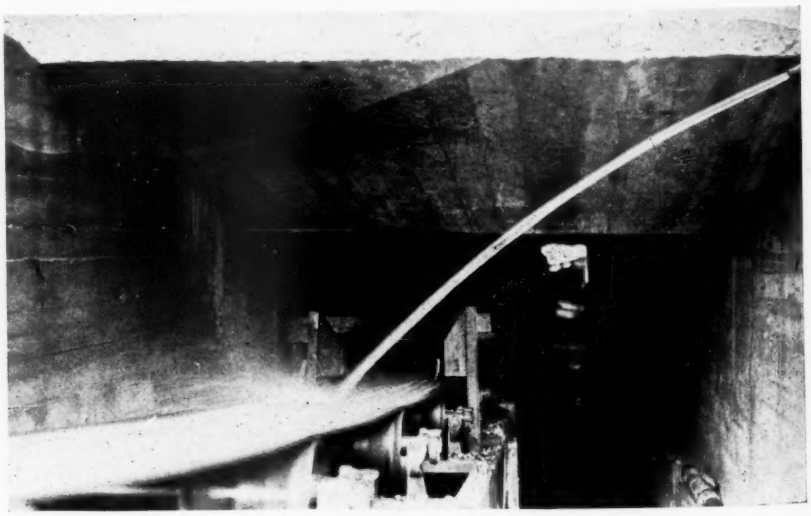
The screens and sand separators discharge into ground storage bins which have end partitions only. The bin for 1½-in. gravel is 32 ft. long; for the 1-in., 20 ft. long; and for the ½-in. and ⅜-in. the bins are each 10 ft. long. Bin storage 54 ft. long is provided for the sand.

Under the bins is a second concrete tunnel 7 ft. high by 8 ft. wide, and 142 ft. long, and 12 gates under the bins deliver the graded material to the loading belt in this tunnel. A single grade can be drawn at a time, or in concrete or other work where mixtures of various proportions are desired, this proportioning can be made of any sizes and in any poportions desired by adjusting the openings of the various gates. This loading belt goes up a 16-deg. incline to a loading hopper over the railway track. Several baffles in the loading chute over the cars help to mix the gravel where a mixture of two or more sizes is called for. The conveying, washing and screening equipment was furnished by the Link-Belt Co.

Tracks for 15 empty cars are already in place, and the first cut of the dragline



A fourth screen was not in place when this view was taken. At the right are the sand separators



The tunnel below the storage bins. Temporarily, a stream of water at this point keeps the belt clean; later, a spray will be arranged under the head pulley, as on the main belt

will clear space for additional trackage. These cars are handled by gravity.

The initial storage pile formed by the scraper provides a reserve of raw material which insures the plant against shutdowns when changing the position of the mast or when any part of the dragline equipment needs attention.

The normal capacity of the plant for a 10-hr. day is 1000 tons and it is expected that from 10 to 12 men will be needed to operate the plant at this rate of output.

A Thomas hoist of 150 hp. operates the dragline and throughout the plant individual motors operate the various units of equipment. Electric power from Niagara Falls is supplied at 11,000 volts, which is stepped down to 440 volts for motors and 110 volts for light.

In Rochester this corporation has constructed an unloading pit from which the material is conveyed by means of Link-Belt elevator and conveyor to a storage bin having a capacity of about 800 tons, which bin is divided into six compartments for different sizes and mixtures, each compartment having a separate gate for loading trucks. The trucks are weighed on 15-ton Fairbanks platform scales.

This distributing station is located on the Terminal Lands of the Lehigh Valley railroad, very close to the center of the city.

The office of the Corporation is located at 511 Cutler building, Rochester, N. Y., and the officers are: Mortimer R. Miller, president; Charles W. Smith, vice-president; George C. Lennox, treasurer; and L. B. Fitch, secretary and sales manager. Raymond C. Brotsch is plant superintendent.

A Growing Labor Shortage

REPORTS of labor shortages are increasing in number and including common labor as well as skilled and semi-skilled, according to a nation-wide survey by the National Industrial Conference Board. The continued reports of unemployment from some sections, contrasted with labor shortages reported in others, indicate, the board says, that there is at present a large dislocation of labor supply, and that as business conditions improve more difficulties will be met in securing desired help, which may develop into a national problem of some importance. The limitation of immigration by law during the next two years will play a large part in this situation.

The board's statement says:

The first report of a labor shortage in the United States came in March from Gray's Harbor, Wash., where common labor for work in logging and lumbering was needed. The next locality from which a shortage was reported was Detroit, Mich., where difficulties were encountered in securing skilled operatives and a shortage was reported impending, if absorption of experienced workers continued at the rate then prevailing. A number of plants began to train men for special jobs to prepare for a future adequate supply. By the middle of May the shortage began to be felt more keenly and a dearth of automobile body builders, semi-skilled operatives of machinery, specialists of various kinds, and even unskilled labor was reported. At the same time, employers in Detroit were resorting to war-time competitive methods of outbidding each other for desired help and even going so far as "shanghai-ing" men by trucks from the gates of other factories. The changed labor situation and the boosting of the price for labor forced several companies to raise their wage scales in order to hold their help or to draw out additional workers.

By the middle of April reports of labor shortage began to come from the Calumet region in Indiana. Here the lack of steel, metal and factory operatives was ascribed especially to the return of foreigners to their homelands, to the removal of others during the depression, and to the minimum wage scale of 28 cents an hour, which was regarded as too low to draw out the desired labor. At about the same time an acute shortage of semi-skilled rolling-mill workers was reported in the Youngstown, Ohio, steel district. By the beginning of May, Milwaukee, Cleveland, Akron, Ohio, and Flint, Mich., began to report difficulties in securing an adequate labor supply. These difficulties were at first confined to factories, but later began to extend to building construction and other outdoor occupations.

Meanwhile, difficulties were beginning to be reported from various localities in securing desirable experienced workers for farm help. Reports of such shortage have been frequent in the Middle West and in the South.

With but one exception, where female help was reported short in the hosiery mills in Laconia, N. H., no difficulties in securing help came from New England until June. In the Middle Atlantic States, however, shortages of unskilled laborers and of farm help began to appear in April and have been reported with increasing frequency to the present.

The board's survey indicates that, in general, the reports of labor shortages are concentrated in the Colorado and Arizona mining regions; in the Oklahoma oil regions of McClain county and Creek county; in the states of Wisconsin, Michigan, Indiana, Ohio and Western Pennsylvania and in the coast states of New Jersey, Connecticut and Massachusetts, and to some extent in North Carolina.

By the beginning of June about 180 reports of labor shortage were received from almost all sections of the country, and it would appear that during the next few months reports of increasing difficulties in securing proper help will be reported.

Generally, very little is being done in a constructive way to meet this labor shortage. In the building trades active steps are being taken and apprenticeship plans are being worked out. In a few fatcories emergency training courses are being installed, but on the whole plants are using the expedient of increasing wages to draw out necessary labor.

Practically no relief in the situation can be expected for man increased supply of labor through immigration.

An increase in our own population sufficient to make up for the required labor supply is not to be expected. The problem thus is one which threatens to become more acute and awaits the solution of industrialists.

Tennessee Wins Gravel Case

THE long fought suit for a reduction in freight rates on gravel in Tennessee was won when the United States Supreme court denied a motion of the railroads, the United States and the Interstate Commerce Commission for a stay of judgment.

In permitting an increase of freight rates upon strictly state transportation, in conformity with the orders of the Interstate Commerce Commission, Tennessee, through its railroad and public utilities commission, provided that the old rates should be maintained upon carload shipments of stone and gravel within the state when intended for use in building highways and consigned to state, federal, county or municipal authorities. The state won in the United States District Court for Middle Tennessee.

The decision to oppose a horizontal increase of 25 per cent originated in the Memphis Chamber of Commerce. Mr. Farley of the Chamber of Commerce took the case to Nashville, where he obtained the co-operation of W. H. Swiggart, Jr., assistant attorney general of Tennessee. Mr. Swiggart fought the case through all of the federal courts and won in each one.

His victory will save the state hundreds of thousands of dollars. West Tennessee, which has the greatest amount of road building projected and under way, will benefit most.

Washing Without Stripping

Beder Wood's Sons Company, at Moline, Ill., successfully handles its deposit with heavy overburden of top soil by double washing

A PROBLEM which very many sand and gravel producers have to meet is that of stripping. It is always a question—to be decided by local conditions—whether the top soil should be stripped and only the clean material below it sent to the washing plant, or whether the deposit should be mined as a whole and the top soil removed along with the clay, which is found throughout the whole deposit, by washing.

The Beder Wood's Sons Co., of Moline, Ill., is working a deposit with a very heavy burden of top soil on the bank of the Mississippi river, near Moline. The layer of top soil varies from 4 to 6 ft. in thickness. Following ordinary practice this overburden would be stripped, but owing to the difficulty of disposing of the strippings, and other local conditions, the company prefers to mine the deposit as a whole and remove the top soil by washing.

The greater part is removed by the method of mining in which a section pump with a 10 in. centrifugal pump is used. The discharge from the pump goes to an 80 ft. barge of the regular type employed in dredging operations and the overflow from the barge carries away the greater part of the top soil along with the clay and some fine sand, but it is estimated that the clay and sill remaining on the barge is still 8 to 10 per cent of the whole.

Loaded barges are towed to the washing plant, which is on the river bank, and close to the railroad track, so that cars are filled directly from the bins. The barges are unloaded to a stock pile which is built over the receiving hopper of a belt conveyor. The material as unloaded contains about 40 per cent gravel and 60 per cent sand, not counting the 8 to 10 per cent of clay which is present.

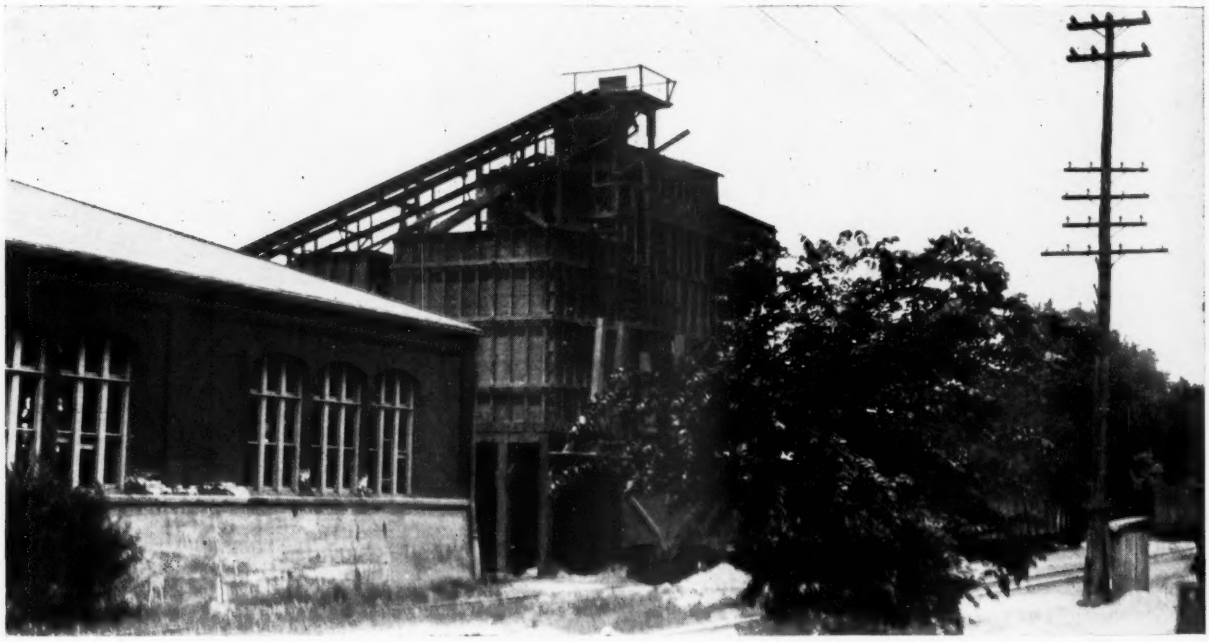
The hopper has an adjustable gate at the bottom, and the material is drawn from it by a feeder designed and built at the plant. This feeder is merely a short belt conveyor, the belt carrying steel flights which draw the material forward as they pass under the gate. It is said to be very satisfactory in operation and of low repair cost.

From this feeder the conveyor belt (the lower end of which is in a tunnel under the stock pile) takes the material to a hopper at the top of the washing plant. Water is added here and all the material is passed over a Mitchell screen with ¼-in. square openings. As a great deal of coarse oversize is passed over this screen, a fabric of heavier wire than is usually found with this size of mesh has been used, to save the expense of screen replacement. The fabric needs replacing after—from 6000 to 7000 yd., have been screened. Experiments are being made with a preliminary screen to take out the coarser pieces of oversize, reducing screen wear and giving greater capacity to the screen.

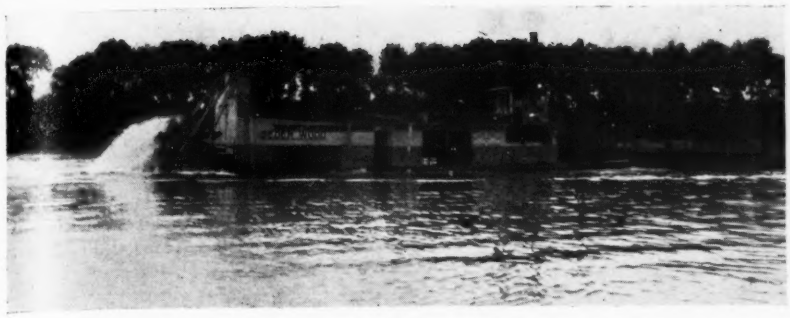
Heavy sprays are used on the Mitchell screen both to assist in screening and to wash the gravel.

The gravel (retained on ¼-in. square mesh) goes to a sizing screen of the ordinary cylindrical revolving type. The jacket of this screen has four sizes of punched round holes, from 1 to 2 in. in diameter. Each size of gravel falls to a separate bin and the oversize goes to a rock crusher.

The gravel mostly comes from hard



Beder Wood's Sons Co.'s plant at Moline, Ill., as seen from the tracks of the C., M. & St. P. railroad



The company's steamer, the "Beder Wood," with sand barges

rocks, trap, quartzite and the like, which is evidenced by the wear on the crusher plates, but which makes a coarse aggregate of excellent quality.

The undersize of the Mitchell screen, which is sand all of which has passed a ¼-in. square opening, flows, with the water, down a broad trough to a 4.3-ft. Allen sand tank. This is used both as a simple dewaterer and a classifier.

Used as a dewaterer, the overflow of the tank contains only clay and silt and fine sand, the greater part of which will pass a 100-mesh screen.

When it is used as a classifier, the reduction plate is moved forward to cut down the settling area of the tank, and a smaller discharge opening or "spigot" is inserted below. The change only takes a minute or so and may be made without shutting down the plant. The sand in the overflow is then plaster sand, of such fineness as desired, the size of the grain being regulated by the position of the reduction plate.

At present there is no way to dewater this plaster sand except by running it into a bin, but a second Allen sand tank is shortly to be installed for this purpose.

The plaster sand generally used in this locality is pumped from bars in the river and must be screened by hand before it can be made into mortar. As the overflow sand contains no oversize pebbles it needs no screening. By adjusting the tank correctly a plaster sand can be made which contains practically the same grain sizes as the river sand, except for the coarse oversize.

The Beder Wood's Sons Co. plant has a capacity of from 400 to 500 yd. daily and the product is largely sold for making concrete roads in both Illinois and Iowa. It will be noted that the system is really that of double washing the pumping and collecting of sand on the barge giving a preliminary washing which leaves a material that is practically the same as that mined from a bank which has been stripped.

The name of Beder Wood has been known for a great many years in the sand and gravel industry, as the father of the sons who now conduct the business dealt in building materials at Moline for more than a quarter of a century. The elder Wood was a rather remarkable man who made a success in several lines of endeavor. Horticulturalists will best remember him as the propagator of several small fruits, among them the famous Beder Wood strawberry.

Dewatered discharge from Allen sand tank, above the sand bin

Kelley Island Co. Gives Famous Rock to Museum

JUTTING out of Lake Erie near Kelley's Island, north of Sandusky, is "Inscription Rock," so-called because of the deeply carved Indian writing on its surface. This rock has been deeded to the Cleveland Museum of Natural History by the board of directors of the Kelley Island Lime and Transportation Co.

The top surface of this rock, which is 32x20 ft. in extent and stands 11 ft. out of the water, polished smooth by glacial action, made an ideal background for the history of the Indians of the Lake Erie region. And here, in the pictographic characters of the aborigines, in the human figures, the pipes and the smoking groups, is told the history of the peoples who have left their names about the lake. The occupation by the Erie tribe, the coming of the Wyandots, the final triumph of the Iroquois, negotiations, crimes and turmoils are all recorded on the rock which Schoolcraft's "Indian Antiquities" calls "by far the most extensive and well sculptured and best preserved inscription of the antiquarian period ever found in America."

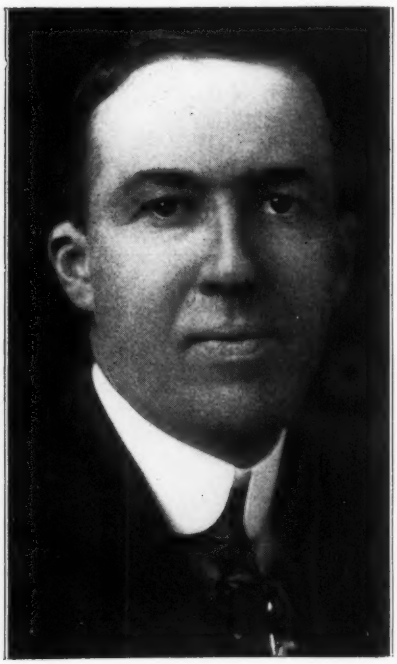
"Because of the softness of the limestone," said Paul M. Rea, director of the museum, "steps must be taken at once to preserve the remaining inscriptions. It is doubtful if the whole rock will ever be removed to the museum, but restorations may be made. The Historical Association has casts which were made before the rock had weathered so severely."

The inscriptions were first known to white man about 1833, soon after Datus and Irad Kelley bought the island. They were discovered by Charles Olmstead of Connecticut, while he was tracing and studying the glacial grooves. Col. Eastman, U. S. A., was detailed by the government to study them in 1851 at the suggestion of Gen. Meigs, who had seen them. Shingvank, an Indian, learned in Indian pictography, gave his approval to the interpretations.

This is the river side of the plant showing the conveyor which takes the sand to the hopper above the Mitchell screen

A Visit from Richard K. Meade

WE had a brief visit from Richard K. Meade, of Richard K. Meade, Inc., Baltimore, Md., on June 22, one of the leading authorities in this country on lime, gypsum, and cement. He was out to the Pacific coast recently and made a two-months' survey of the gypsum de-



Richard K. Meade

posits in that section. Business in the West is very good, declared Mr. Meade.

He has also constructed a lime plant at Bathurst, Canada, recently. At the present time he has under consideration several cement projects.

During the trial of the Eastern cement manufacturers at New York City Mr. Meade was retained by the defense as an expert witness. Naturally, he was more or less guarded in expressing his opinion as to the outcome of the coming trial of the Midwest manufacturers, but he is in substantial agreement with the editors of Rock Products that the result of this trial will prove that the government has no case against the cement companies in this section.

International Cement's Profits

IT is expected that the International Cement Corp. will show earnings for the second quarter of this year equal to $1 to $1.25 a share on the 323,978 common shares after preferred dividends. In the first three months profits figured out 52½ cents a share on the common stock. The first half-year, therefore, promises to show $1.50 to $1.75 a share.

"Big Murph" Is a G. S. M.—and This Goes!

THIS headline does not mean that we are calling him names. What we do mean is that the many friends and acquaintances of Fred C. Murphy—better known in the trade as Big Murph—will be glad to learn that he has been elevated to the position of general sales manager of the Brownell Improvement Co., of Chicago, and will take direct charge of sales today, July 1.

Mr. Murphy is a Canadian by birth and a live American citizen by adoption. He came to Chicago eight years ago when he became associated with the Brownell Co., serving first as salesman in the company's Illinois Central territory. Here he made a host of friends and developed a substantial business for the firm among the contractors and dealers along this line.

In 1919 Fred was made secretary of the company. He will continue to serve in that capacity in conjunction with his new position. He reports a good business so far this season and is particularly optimistic for the future because of the state highway department's extensive program for road construction throughout Illinois.

Fred C. Murphy, general sales manager, the Brownell Improvement Co.

The company's daily shipments, while not taxing the plant's large capacity, are big, and increasing constantly.

Rock Products often spots Murph on the job at the numerous lettings, and we are beginning to suspect, from his extraordinary zip and pep, that our old friend Harold has been letting Fred into the secret of the gland rejuvenation, live-to-be-a-hundred treatment.

He is a keen lover of sports, having a preference for football and baseball—in fact, he made a jolly good name for himself with his school team at his former home, Hamilton, Ont.

"Do I read Rock Products?" says he to me. "The best magazine in the world!" says he. "But this interview stuff, Liman, ol' top, is like having an old suit pressed and trying to kid yourself into thinking it's a new one."

The Brownell Improvement Co. is to be congraulated on its new general sales manager. Good luck to you, Big Murph!

L. S.

No Date Set for Midwest Cement Trials

THE report that the Midwest cement manufacturers were to be brought to trial on June 15—and this report emanated from the Department of Justice at Washington—was an error.

According to the best information obtainable, no date has as yet been set for this trial or for that of the Eastern manufacturers. Both of these cases, Rock Products believes, will be held over until the fall, as most of the cases of like nature are tedious alike to both the presiding judges and all concerned in the hot summer months.

Granville Gravel Co.'s Recent Operations

THE Granville Gravel Co., of Granville, Ohio, has made preliminary announcement of its forthcoming review of its recent operations. This review, prepared under the direction of Frank M. Welch, chief engineer of the company's engineering department, says that the company during the past 21 years has owned and operated 16 sand and gravel plants, the operations meeting with every variety of local and market conditions which affect methods of excavation, conveying, washing, crushing, screening, plant construction, and shipping.

Among the plants shown in the illustrations are those at Fort Jefferson, Mechanicsburg, Ohio, Richmond, Ind., Massillon, Logansport, Ind., Millbrook, Mich., equipment of these plants and of the allied interests connected with the parent Hartford, Conn., Dayton, Ohio. Mention is also given of the capacities and company.

The Removal of Clay from Sand and Rock

By EDMUND SHAW
of the Allen Cone Co., El Paso, Texas

IN the preceding numbers of the series of which this is the conclusion, the writer has tried to bring out two things. The first of these is that washing is not a hit-or-miss business to be worked out by guess and rule-of-thumb.

It is a very important industrial process, with well defined and understood theoretical principles and rules. Real engineering skill must be used in the application of these principles if the plant is to be operated efficiently and economically. The second point is that the process of washing must be applied to so many different materials and undesign, so it is quite understandable that there can be no standard design of washing plant. Each deposit to be washed fixes the design so it is quite understandable that there should be such wide variations as will be remembered by any reader of ROCK PRODUCTS who notes the illustrations and descriptions of plants which are published in every issue.

Plants may be simple or they may be complicated, as conditions direct, and it would seem quite obvious that the designer should put nothing in a plant that was not needed and that he should put everything in a plant that was needed. But both mistakes are made. In a previous installment it was pointed out that scrubbers have sometimes been added to a plant in the hope of producing a cleaner product, when the only chance of bettering the work lay in using more water to carry away the clay which was already freed from the grains. This would be putting something in the plant that was not needed. The failure to put in something that was needed might be illustrated by a plant giving the crude material a single wash when the amount of clay present was so large that no single wash would remove it unless the quantity of water used was beyond all reason.

In both cases the error would be due to ignorance of the principles of washing. The plant manager or designer who understood the very first of the principles of washing, the relation of overflow to residual water, would know that he could not possibly remove the clay that *must* accompany the residual water remaining in the voids of the sands by scrubbing the surface of the grains. In the second case, if one had calculated the amount of clay present in the unwashed material and compared it with the amount permitted in the finished product, he would have seen that to remove so large a proportion in a single wash would require too much water, and too large a settling area also, in most cases, to be economical.

(The calculations referred to, with examples and diagrams, are to be found in ROCK PRODUCTS for March 25.)

THIS tenth and concluding installment well proves Mr. Shaw's assertion that "washed sand is a manufactured product." It also shows that a plant may be overburdened by unnecessary equipment, which can be avoided if the needs of the product are studied before building the plant.

Variations in Design

The variations in washing-plant design referred to are so many that a book, rather than a magazine article, would be needed to consider them all. However, if we study them we will find that they can be classified into a few groups, beginning with the simplest form and going forward to the most complex.

Single-Product Plants

The first group will be called single-product plants, since only one of the products is marketed. An example would be a plant producing only concrete or building sand, pumping it from a river or lake bed and settling it in a barge or a simple bin or tank on the shore. It would seem that the washing part of such a plant was so simple as to be almost non-existent. But the principles of washing and of sand-settling have to be considered to some extent. The settling basin on the barge or the bin must be sufficiently large or it will not settle all of the sand. And it must not be too large or it may settle silt and clay. Usually, these simpler forms of sand settlers are found unsatisfactory and better devices—automatic sand settlers—are installed. The barge then becomes only a means of transporting the washed material to market and the bin is afterward used for storage instead of a washing device.

Producing More Than One Size

The point that marks the one product plant, however, is that there is no screening or classification by rising currents of water to produce more than one size of washed product. Sizing marks the second of the two main groups which we will call plants producing more than one size of product. Screening is not a part of washing, but it is almost always combined with washing, and for very good reasons. Perhaps the best of these is that both operations can be carried on simultaneously, and while the material treated is in motion. Another good reason is that both the capacity and the efficiency of the screen are increased if the material is accompanied by sufficient water to wash the undersize through the meshes. Hence the water used for washing serves a double purpose in the plants which produce more than one size.

Classification a Wet Process

Classification, usually applied to making the finer separations, is necessarily a wet process, since rising currents of water are used to make the separation. The water for washing may be used to do all of the work, or it may be supplemented by other water used to complete the process and make a cleaner separation than would otherwise be possible. This extra water, called hydraulic water, is really a special form of washing—a most efficient form—since the clean water is forced up through the sand with sufficient velocity to lift clay, mud or fine grains and remove them completely from the washed product.

Since the introduction of screens that will successfully handle damp sand (those which vibrate the fabric), plants have been built which remove screening from the washing process. The sand is washed in the ordinary way and afterward screened. In one plant the writer saw recently the washed sand was collected in a bin and drained and then excavated by a clamshell which delivered it to the hopper of the screening plant. In this case there was a reason for wishing to obtain as dry a product as possible, but under ordinary conditions the economy of such a method seems doubtful. The capacity of any type of screen is certainly improved if the material is accompanied by plenty of water, and the expense

of dewatering, excavating with a clamshell and lifting to the hopper would hardly be less than pumping both sand and water to the hopper in a single operation.

Plants Using Scrubbers and Disintegrators

The two groups just described will include all plants, but certain plants are further grouped because they handle material that cannot be treated by the simpler methods of washing and screening. One such group will be called plants which use scrubbers and disintegrators. These plants may produce one or more products, but the particular point to be noted concerning them is that they are able to remove the difficult forms of clay, films on the surface of the grains and clay balls. For the cheaper kinds of washed material, such as concrete and other building sands, these plants are rarely used as the deposits usually worked do not contain much clay in these forms and the expense of washing has to be kept at a minimum.

It is not uncommon, however, to find a simple cylindrical scrubber preceding the screens in an ordinary sand-washing plant, and the ordinary trommel or revolving screen is an excellent scrubber in itself.

More Elaborate Equipment

Products which sell at a higher price in the market, such as phosphate rock, will stand the expense of more elaborate equipment for scrubbing and disintegrating, and the deposits are usually of such a nature that they require it if the plant is to turn out a merchantable product.

Silica sand is another material which usually receives a very thorough scrubbing before it is ready for sale, and large and well-designed plants have to be erected in order to do this work without going to too much expense.

An extra operation, however, requires more plant space, and as scrubbing is a mechanical operation requiring power and special machinery, the plant has to be better constructed and more carefully protected from the weather than the ordinary types of plants. Hence the appearance of such plants is no more that of the simple single-product plant than the appearance of a battleship is that of a fisherman's sloop. Yet each is just as good in its way and each conforms to the rule of having no more than is needed in the plant and at the same time, everything needed in order to do the required work.

When More Than One Wash Is Needed

The fourth and last group is that of plants which give the material more than one wash. Usually such plants belong also to the third class, because they use scrubbers and disintegrators, but this is not always the case. The writer knows of a plant now in course of erection in which two washes will be employed merely to economize in the use of water. For, as has been shown in a previous article, the dividing of the water into two or more washes greatly increases the efficiency of the washing. Plants which have scrubbers and disintegrators of necessity usually give more than one wash, as a rinsing at least is necessary to carry away the clay which has been scrubbed from the surface of the grains.

Washing of Fines

To the phosphate rock and silica sand plants which have already been mentioned as being in this and in the preceding group, may be added the plants which are now being erected in considerable number for the washing of fines from limestone quarries. Some of these find that both scrubbing and a second wash are necessary to produce a clean material for the market.

Let us point out here that there is sometimes a choice of methods. As an example, there is a plant treating material from a deposit which had 4 or 5 ft. of top soil, loam and the like. The question was whether to strip the deposit and give a single wash or to mine everything and give two washes, since a single wash was not sufficient to clean it. In this particular instance the use of the two washes was chosen, owing to the difficulty of disposing of the strippings.

Some Reasons for Failure

In conclusion, a word or two may be said as to the failure of plants to function properly or to be operated at an economical cost. In either case, the fault comes from errors in design, and perhaps the commonest source of such error is the copying of a plant without understanding or appreciating the conditions for which it was designed.

As an illustration, let us say that plant A has a screen which does very good work. It is placed in plant B and found to have too low a capacity. Investigation shows that it is handling a material at B quite different from that it handled so successfully at A, and in order to get the capacity at B a larger screen, or a second screen of the same size, must be installed. But this plant has not been constructed to allow this change without a great deal of expense for tearing out and replacing other parts of the plant. What usually happens is a trying time of unsuccessful operation which might have been avoided if the material had been properly studied before the plant was built.

Another frequent source of trouble is insufficient height. The designer naturally wishes the cost of building and of elevating the product to be kept down, which is good practice if it is not carried to excess. Where it results in chutes and launders which have not enough grade to carry the material, it is a serious mistake. Nothing around a plant will give more trouble than the continual choking of chutes and launders, resulting in the overloading of machinery and the filling of elevator boots and slops and spills everywhere throughout the plant.

Faulty Construction

Poor construction is another error that gives rise to plenty of trouble in operations. From motives of economy washing plants cannot stand too much expense for construction. When the deposit is worked out they will have practically no salvage value, then the entire cost is a charge upon the working of the deposit. Here again a good rule may be carried too far. If too much is saved on construction, all that is saved—and a lot more with it—will be added to the cost of operation. The plant that is "in danger of falling down if somebody gives it a cross word" is indeed an expensive plant to operate, and not the least part of the expense is that of lost time in which men stand idle waiting for repairs to be made and the overhead goes merrily on.

(Concluded)

The Menace of the Wayside Pit

THE BULLETIN is being generally commended for its attitude toward the wayside pit. It is being especially commended for an article in the April issue—"Geological Survey Was Right!"—quoting an official report of the United States Geological Survey. That report read: "There is, however, a surprising lack of appreciation of the importance of preparing sand and gravel for building purposes."

There *is* a "surprising lack of appreciation" on the part of some contractors and builders and investors. And there is a still more surprising lack of appreciation on the part of those who pay the bills—either as private individuals or as taxpayers. Lack of appreciation of danger to life. Lack of appreciation of the shameful waste of money when an unclean, unsuitable sand or gravel is used in construction.

The established commercial plants only are prepared to furnish a material that means a safe building, a road still there when the bonds are due. The cost of sand or gravel in construction, in hard-surfaced highways, is a small part of the total cost. Cement, freight, labor come first. Yet, sand or gravel is the most important part of construction! To attempt to economize by using an unclean material is an utter absurdity and worse, inviting loss of time, of money, of life itself.

The United States Geological Survey was right when it said: "There is, however, a surprising lack of appreciation of the importance of preparing sand and gravel for building purposes." The wayside pit is a menace and the sooner the public fully realizes this truth the better."—*National Sand and Gravel Bulletin.*

Putting New Jersey's Potash Marls on a Paying Basis

Producers whose capital ranges from hundreds to seven and a half million dollars are profiting, or planning to profit, from the marl deposits of New Jersey. The interesting history of this material and its early development and uses are traced in this first of three articles. Commercial and engineering considerations, together with a description of typical plants, will follow in the next two articles

By John H. Ruckman
Consulting Geologist and Engineer, Philadelphia

DURING the last two years there has been a marked revival of interest in the so-called "marl" deposits of New Jersey. Sixty years ago marl was excavated on a tremendous scale and found a ready market as fertilizer; marl digging was at that time one of the most important and flourishing industries in the state.

The word "marl" has been and is still used rather loosely to refer to a number of very dissimilar types of rock, but in New Jersey it is applied almost exclusively to certain formations of marine origin and of Upper Cretaceous age, composed chiefly of grains of the mineral glauconite. The true composition and nature of this mineral is not as yet fully understood, but it is known to contain a considerable quantity of potash, together with iron oxides, alumina and silica. A certain amount of phosphoric acid is present in most of the deposits, occurring generally as vivianite, but it would appear that the value of the marls as fertilizers may be chiefly ascribed to their content of potash.

During the World War the marls attracted attention as a possible source of potash and potash salts, and many experiments were undertaken both by the government and by private interests with a view of developing processes for the extraction of these salts on a commercial scale. The results of these experiments indicate that under favorable conditions the marls may again become of considerable importance, both as fertilizer and as a source of soluble potassium salts. As the influences which will determine whether commercial exploitation is practicable are numerous and complex, it is the purpose of the present series of articles to draw attention to some of those which are most important, with a view to indicating, so far as possible, what degree of success may be expected and how it may be best attained.

Marl's Valuable Qualities

The valuable qualities of the marl both as a fertilizer and as a source of potash are dependent on the presence of glauconite, which makes up almost 90 per cent of the mass. This mineral is described by Dana as "essentially a hydrous silicate of potash and iron," and it has been suggested that aluminum may replace the ferric iron under certain conditions. Dana gives no formula as representing the exact chemical composition of the substance, nor do various analyses agree with sufficient precision to warrant the adoption of one at present. It has been suggested that the mineral is not a true chemical compound, but that some of its components are held in a state of solid solution. This may or may not be the case, but one thing appears certain, and this is commercially the important point; unlike most of the other rock forming silicates—feldspars, pyroxenes and amphiboles—glauconite is easily decomposed by a number of comparatively weak reagents, and when it is decomposed its potash content is liberated in soluble form.

The Percentage of Potash

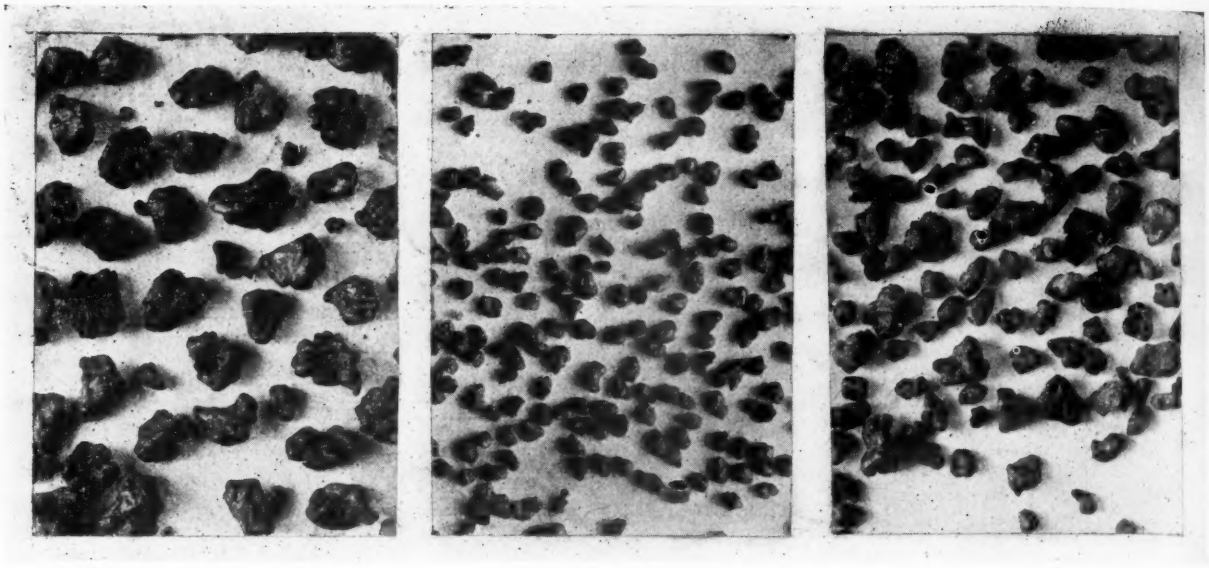
Regarding the origin and mode of formation of glauconite, some doubt also exists. When H. M. S. Challenger was engaged in exploring the various oceans and in charting ocean currents, temperatures, depths, and the nature of the bottom, glauconite was frequently discovered at great depths, generally associated with the shells of minute sea animals. This gave rise to the belief that glauconite was usually formed in sea water, at great depths, and in the presence of decomposing organic matter. The analyses given in the reports of the expedition give an average potash content of only 3.22 per cent. A single sample, however, gave a value as high as 7.76 per cent, being at that time the purest specimen reported.[1]

Specimens of glauconite from more ancient geologic strata, as a rule, show potash contents which correspond to this last figure much more nearly than they do the lower or average value. Samples taken by G. R. Mansfield of the United States Geologic Survey from the New Jersey marls showed more than 8 per cent potash, one analysis giving a value of 8.26 per cent.[2] The great purity of the mineral as developed in these older deposits taken with other conditions has led Mr. Mansfield to suggest that the formation of glauconite and the concentration of potash may take place after the deposits have been lifted from the sea—in fact, that potash is even now being leached from the overlying beds by slightly acid surface waters and is being redeposited at greater depths where oxides of iron, aluminum, and silicon are present under favorable conditions.[2] The observation of the writer in the field substantiates Mr. Mansfield's theory regarding the leaching action of surface waters, and there appears to be no valid reason why potash-laden waters should not deposit this material as glauconite upon meeting waters carrying the necessary precipitating agents. From a practical standpoint, this matter of loss of potash from the upper beds is important since it frequently causes the upper layers of the marl to be of little value; furthermore, samples taken from the upper layers, or from outcrops which have been long exposed, will not truly represent the deposit as a whole. The possibility that the potash may be precipitated again at greater depths gives some hope that richer deposits than those now known may be encountered by more extensive borings.

---

[1] L. W. Collett, Les Depots Marins. *Encyclopedie Scientifique*, p. 137. Paris, 1908.

[2] Physical and Chemical Character of New Jersey Greensand. G. R. Mansfield. Economic Geology. Vol. XV, No. 7. November, 1920, pp. 555-567.



Courtesy U. S. Geological Survey

Much like tiny new potatoes in appearance are the grains of New Jersey's potash-bearing marls, shown here magnified seven times. They have a waxy lustre, and vary in color from greenish black to bluish green

What the Grains Look Like

The individual grains of glauconite range from 1/20 in. in diameter down to the finest dust. In shape they vary considerably, but most of them appear under the hand lense to be lumpy and blistered—*i.e.*, botryoidal, resembling somewhat the form of new potatoes. The grains shown in the illustrations give an excellent idea of their general shape, though they are of course highly magnified. Some grains are smooth and rounded, which suggests that they were formed in water which was not so deep as to prevent them from being rolled about and worn by the action of currents. The luster of the surface is waxy and the color varies from greenish black to bluish green. These colors have given rise to the names under which the various beds are known to the quarry men, who generally refer to the different layers as the blue marl, the green or black marl, and the chocolate marl.

Although these terms are not applied in all localities to the same beds, they do correspond roughly at many places with three well defined geologic formations—the Navesink, the Hornerstown, and the Manasquan. These formations are all of Upper Cretaceous age, and all are of marine origin. As they are situated well inside the continental shelf it appears that they were laid down in water of moderate depth, an inference substantiated by the presence of small angular grains of quartz which could not have been carried any great distance from shore before being deposited. After deposition the beds were raised above sea level and slightly tilted. Their upper edges were beveled off by erosion and later beds of sand and gravel of Quarternary age were laid down on the exposed edges.

Where These Marls Are Found

These sands form the usual overburden of the marl and are at certain points as much as 60 ft. in thickness, though elsewhere they are thin or entirely absent. The sands and gravel are suitable for general construction work after washing and screening and are sometimes quarried on a considerable scale for shipment to Philadelphia and vicinity.

Where the Quarternary beds are absent, or have been removed by streams and railway cuts, the various marl formations can be found outcropping in an irregular line from Sandy Hook to Salem, N. J., and thence southwestward across Delaware and Maryland, finally disappearing in Virginia, as the accompanying map indicates.

The thickness of the deposits decreases as they are followed southward and the potash content of the southern beds is not so high as in New Jersey. In northern New Jersey the three marl formations are separated by layers of sandstone, but to the south these gradually pinch out until at a point a little north of Camden the marls are practically a single bed, though they may be differentiated by beds of shells, and thin layers of less glauconitic material. The beds dip southeastward at about 33 ft. to the mile. The Navesink thus passes beneath the Hornerstown and the latter beneath the Manasquan. All three finally pass beneath younger beds and are to be looked for at greater and greater depths as the coast is approached. Accordingly, east of the outcrop of the upper portion of the Manasquan the amount of overburden to be removed in order to reach the marl increases steadily. The quantity which lies within reach is nevertheless enormous; Mr. Mansfield estimates that marl carrying at least 256,953,000 tons of potash can be excavated by open cut mining with the present equipment. What portion of it can be mined as a profitable commercial enterprise remains to be seen.

The thickness of the marl beds and their potash content varies considerably at different localities. Four typical analyses are given in Table I, while in Table II are shown the thicknesses of the different beds at various points together with their average potash content. The first analysis in Table I is that of a sample from the Manasquan, while the other three are material from the Hornerstown; the former is generally lower in potash but higher in phosphoric acid than the latter. If the potash indicated in Table II were present as commercial potassium muriate (80 per cent KCl), at the present market price of $35 a ton, the marl at the localities mentioned would carry values as follows: Salem $4.63, Woodstown, $4.75, Sewell, $4.48, Somerdale, $4.64, and Marlton, $4.59. If the value of the material in its present form and in the ground were equal to the values just given land in the localities mentioned would be worth from $30,000 to $60,000 an acre.

The actual value of the material, in place, is equal to the prices quoted less compound interest on the value of material not at once available, costs of excavation, treatment to render marketable, freight to market, selling cost, and a reasonable return for time and investment. At present these deductions are so large that it is only under exceptionally favorable conditions that the

value of the land can be considered as in any way enhanced by the presence of marl. Nevertheless, the figures given are instructive, for they serve to show in a striking manner the values which are involved and to indicate the effect on the wealth and prosperity of southern New Jersey which would be produced by the development of a cheap and effective method of putting the potash of the marl beds in marketable form.

Some Interesting History

As a matter of fact, the marls have already exercised a profound influence on the prosperity and growth of the districts in which they occur. Though recent interest in the deposits has been largely centered on their possibilities as sources of soluble potash compounds, the value of the marls as fertilizers was early established.

The first use of the material as a dressing for farm land seems to have been the result of accident. H. C. Cook[2] relates that in the year 1768 a laborer on the farm of Peter Schenk, near Marlborough, in Monmouth county, was digging a drainage ditch when he encountered the marl. The material was thrown to one side and later ploughed and harrowed under. Next season the field became the most productive on the farm and so continued for many years. The fact was noted by many, but no lesson seems to have been drawn from it until in the year 1811 the farm passed into the possession of John H. Smock. He at once made inquiries as to the history of the field and decided to give the marl a more extensive trail. The results were so encouraging that marl was soon in general use in Monmouth and the neighboring counties.

In the meanwhile the value of the marl as a fertilizer had been independently discovered by Cyrenius Van Mater. His brother, who resided in England, had told him of the success attending the use of similar materials in that country and in the year 1795 he undertook experiments which thoroughly demonstrated the effectiveness of the New Jersey deposits. By 1823 the use of marl as a fertilizer had become general throughout South Jersey, and marling continued to be almost universal practice for the ensuing 50 years.

The effect produced by the use of this potash-bearing material on a soil which had previously lacked that necessary plant food to an unusual degree was little short of amazing. Morse's American Universal Geography, published in 1819, referring to the State of New Jersey, says: "At least four-fifths of the six southern counties, or two-fifths of the whole state, are barren. They produce little else but scrub oak and yellow pines."

In 1830 after marl had been in general use for several years, Thomas Gordon in his "History and Gazetteer of New Jersey," published at that date, made the statement: "It would be difficult to calculate the advantages which the state has gained and will yet derive from the use of marl. It has already saved some districts from depopulation, and increased the inhabitants of others, and may one day contribute to convert the sandy and pine deserts into regions of agricultural wealth."

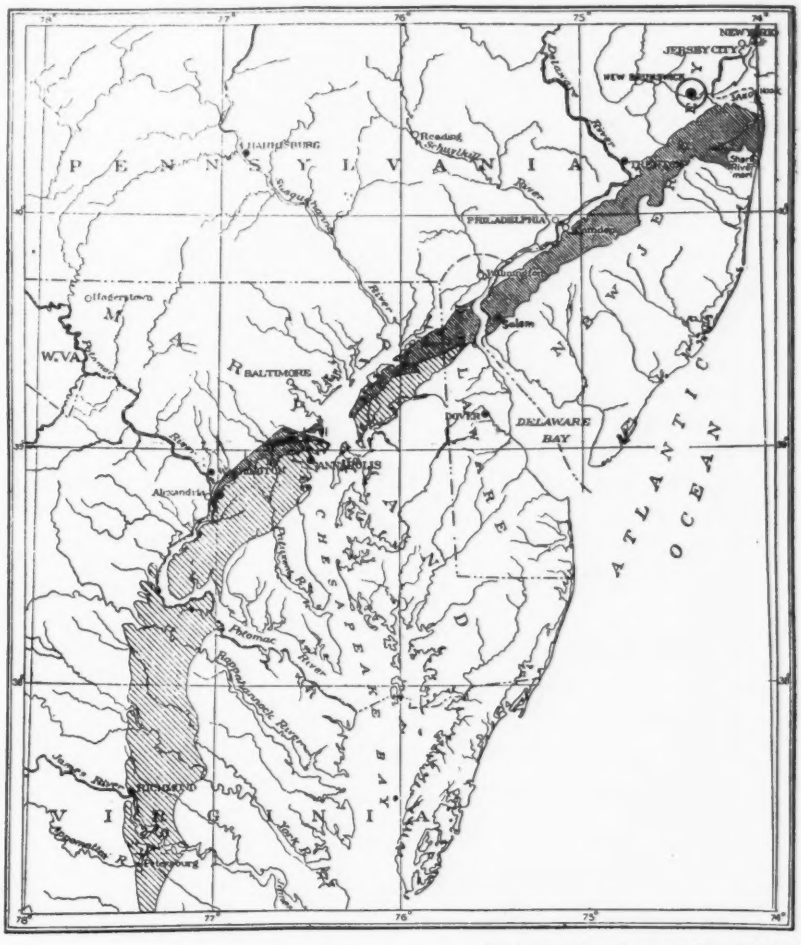
Cook, in 1868,[3] states that "this prediction is fast being fulfilled." As a proof he calls attention to the fact that the southern counties, which in 1819 were truthfully described as wilderness, had become the richest agricultural district in the state, a result directly attributable to the use of the potash-marls.

How the Industry Thrived

Excavation of the marl as an industry increased steadily as the use of the material extended. On the uplands the marl beds were generally buried beneath Quarternary gravels, but in the early days most farms in the marl belt could obtain the material from some hillside or from the bed of some stream where the action of the water had washed away the gravel and exposed the underlying beds. All that was necessary was to drive a team into a creek bottom near the bank and shovel in the marl. The work was generally done by the farmer and his sons during the winter months when otherwise both they and their teams would have been idle, thus the material cost them practically nothing.

Changing Conditions Cut Profits

As time went on conditions changed. The pits in the valleys got below water level and those on hillsides as they were extended encountered increasing quantities of valueless overburden. These pits became ultimately unprofitable to work and operation began to concentrate at larger quarries in more favorable locations. Some of these were controlled by individuals while others were operated by stock companies. As the demand for marl increased these companies continued to increase in



Courtesy R. Norris Shreve and "Chemical Age"

At various points the marl formations are found outcropping in an irregular line from Sandy Hook to Salem, N. J., then southwest across Delaware and Maryland and into Virginia. The cretaceous marls described in this article are those heavily shaded

[2] Geology of New Jersey, 1868. H. G. Cook.

number and prosperity until, about the year 1870, the industry was in a thriving condition. At that date common labor, mostly American born, cost about 75 cents a day, while a team of horses and a wagon with a boy to drive could be had for $1.50.

Such information as is now available indicates that the labor cost of removing the marl at this period was about 18 cents per cubic yard, containing approximately one ton of dry material. As excavated, the marl commanded a price of 40 cents a ton f.o.b. pit, and sold at $2.00 a ton, f.o.b. Salem, and $3.50 f.o.b. South Amboy. By 1868 the annual consumption of marl in New Jersey alone had reached 1,000,000 tons per year, while a large tonnage was shipped elsewhere.

The tremendous demand can best be understood by studying the method of application. The marl, as might be expected, proved most efficacious when used on potatoes and buckwheat, though most crops were benefited by it. It was also noted that it was especially effective in rejuvenating worn-out land and in conditioning sandy soil which had previously lain barren. For such work as high as 500 tons to the acre were frequently used while 200 was considered conservative practice.

The potash contained in such quantities corresponds to 71 and 27 tons of commercial potassium muriate respectively. One-tenth of such a dose in that form would have killed every plant on the land, but applied in the form of marl abundant crops resulted. Later on, the amounts used were somewhat reduced. One common system was as follows: Corn was planted in the spring and harvested in the fall; rye was then sown and during the winter marl was applied, the usual amount being 25 tons to the acre; the rye was harvested and the field was then left for a year in hay and the cycle repeated. It needs only a very elementary calculation to demonstrate that potash was being supplied to the land much faster than it was being withdrawn by the crops and as glauconite is practically insoluble in water, there was only slight loss by leaching. The time was therefore approaching when the demand was certain to fall off.

Very few among those connected with the industry at the time realized this fact. On the contrary, each year new companies were formed and new pits opened. Each new pit was a little less easily operated than those already opened, those already in operation found the overburden increasing, other engineering difficulties were encountered which increased the cost of production. At the same time, competition was becoming keener and the market—which in this case was governed by the condition of the soil of New Jersey—had become badly oversold. These conditions were in themselves sufficient to bring about a dangerous reaction. The immediate causes of the decline in the industry, however, were the financial depression of the eighties and the introduction of the soluble fertilizers containing imported potash salts.

As will be demonstrated in a later article, had not the soil been overcharged with potash, the marl might have competed with the new materials. The soil, however, was not only overcharged with potash but it had been drained of such materials as sulphur, lime phosphates, and nitrates, for while the marl contained some of these essential plant foods, it did not carry sufficient to make good the drain caused by 50 years of cultivation. The new fertilizers were far less bulky than the marl, and just as the latter had contained what the soil lacked when it was first introduced, so now the new materials gave the plants what they needed and brought results.

Under these conditions the marl industry rapidly dwindled. A few favorably situated pits operated for many years; Thomas Early, of Pemberton, states that as late as 1895 the marl pits around Pemberton and Birmingham were still shipping out a trainload a week, but finally it was noted that land which was not being fertilized in any way was producing crops equal to that on the land which had been heavily marled. This fact was soon quite generally recognized and the last pits were forced to suspend. For the next 20 years the industry was practically dead.

TABLE I—TYPICAL ANALYSES OF NEW JERSEY GREENSAND MARL

	A	B	C	D
SiO_2	68.90	50.74	51.83	50.32
Fe_2O_3	8.91	17.36	17.15	18.38
FeO	1.52	3.34	2.93	3.02
Al_2O_3	3.52	1.92	6.23	7.53
CaO	2.10	2.86	0.62	0.65
MgO	1.90	3.76	3.66	3.82
K_2O	3.56	6.68	6.60	7.88
Na_2O	0.82	1.53	0.76	0.22
CO_2	1.00	0.88	0.36	0.15
P_2O_5	1.05	1.79	0.31	0.22
H_2O	7.68	9.08	9.98	8.58

A Revival of Interest

The revival of interest in the glauconitic marls is directly due to the recent war. In 1910 German companies had shipped commercial potassium muriate to the United States and had delivered it at $32.98 a ton c.i.f. pier at any Atlantic port. Between 1900 and 1914 we imported an average of 257,143 tons of potash (K_2O) per year; in 1911 the muriate (KCl) alone amounted to 214,283 tons. The imports fell off slightly during the next two years, but at the opening of the World War we were absolutely dependent on Germany for our supply of this essential element. With the establishment of the British blockade the price of potassium compounds began to rise.

As warehouse stocks dwindled the price continued to climb until muriate was quoted at $300 and $350 a ton. The demand for potash fertilizers at reasonable prices soon became acute. It might have been expected that under such conditions the marl industry would have burst into activity, but the reawakening was gradual. The public had been educated to the German product and potash which was not soluble in water appeared to many as being of very doubtful value. The United States Department of Agriculture took the matter up, however, and experiments were begun at the New Jersey Experiment Station with a view to determining the true merit of the domestic product.

When the United States entered the war the potash situation became much more serious. Not only was the compound needed for fertilizer but it was indispensable for the manufacture of black powder and for that class of military explosives known as chlorate mixtures. The situation was critical and scientists and inventors throughout the country began to co-operate with the government in searching for possible sources of potash and in developing processes for extracting it in soluble form.

It would appear that, largely through a misunderstanding of the nature of glauconite, the greensand marls did not at first receive the attention which they deserved; much effort was wasted on such minerals and rocks as orthoclase feldspar and leucite, both of them rich in potash but both of such stable chemical composition and so difficult to mine and mill as to offer small hope of becoming commercial sources of potash. Shortly before the armistice the United States Geological Survey, in conjunction with the Department of Conservation and Development of the state of New Jersey, undertook a thorough examination of the marl deposits with the object of determining their possibilities for the production of potassium compounds. This work was carried out under the direction of G. R. Mansfield, of the United States Geological Survey and it is largely to his thorough and conscientious work that we are indebted for our present knowledge of the marl deposits.

Unbelievable Prices for Potash

In the meanwhile, stimulated perhaps by the high market price, a number of inventors had developed processes for the extrac-

TABLE II*—THICKNESS AND POTASH CONTENT OF MARL BEDS AT VARIOUS POINTS IN NEW JERSEY

	Tons per acre K_2O	Navesink Thick.	Navesink K_2O	Hornerstown Thick.	Hornerstown K_2O	Manasquan Thick.	Manasquan K_2O
Salem	3800	12′4″	6.19%	9′ 0″	7.19%	2′0″	7.26%
Woodstown	6200	12′0″	6.12%	11′ 7″	7.58%	8′9″	6.69%
Sewell	6400	8′4″	6.09%	10′10″	7.52%	15′5″	5.99%
Somerdale	5200	.....	.....	9′ 1″	7.35%	18′0″	6.32%
Marlton	9400	9′7″	6.10%	12′11″	7.26%	28′2″	6.32%

*From a paper read by G. R. Mansfield before the Mining and Metallurgical Institute. Mining and Metallurgy, January, 1921.

tion of potash salts from glauconite marls and a number of companies had undertaken production on a commercial scale. With potassium muriate at $350 a ton, the Jersey marls carried values of more than $40 a ton, an amount sufficient to justify very extensive concentration and smelting treatment. It would therefore appear that these companies should have got out a large tonnage, but various factors interfered. Their rating by the War Industries Board was unfavorable as regards priority on material and machinery. Some of them were planned on a large scale and time was required to complete their plants. Others suffered from poor engineering. In any case the armistice found them all still in the experimental stage, and a rapidly falling market has forced a number to suspend or materially alter their plans for development, while the survivors have been forced to great inconvenience and the most extreme economy in order to complete their plants to a point where commercial operations under present conditions can be attempted.

Since the armistice a number of other events have occurred which have influenced the situation. The experiments carried out by the Department of Agriculture at several agricultural experiment stations, of which more will be said later, have demonstrated that the potash in the marl, while not soluble in water, is nevertheless readily available for the plant, and that the potash of the marls is in fact of more value pound for pound than that of such soluble salts as potassium chloride or sulphate. It has also been found that there is a demand for the material for use in water treatment plants, and there seems a strong probability that it will soon be in demand as a fertilizer base.

New Processes in Development

New processes for the extraction of soluble salts continue to be developed, and if sufficient capital can be obtained to carry on the work, it seems only a question of time when a thoroughly satisfactory one will be found. It would appear self-evident that, were no other parties interested, the people of New Jersey can scarcely permit a natural resource with a potential value of $20,000,000,000 to remain undeveloped, if human ingenuity can find a means of capitalizing it. Neither can the United States Government neglect to encourage the development of an industry upon which the fate of the nation may depend in time of war.

In the meanwhile, small pits have been reopened, plants for drying and screening are in operation and they report steadily increasing business. The prices at which marl land is changing hands has increased markedly and there are indications that with a little encouragement the industry may soon regain the important position it once held.

(To be continued)

Problems of the Fertilizer Industry

Following are extracts from an address by President Charles H. MacDowell of Chicago before the National Fertilizer Association:

"Last year's forecast was not reassuring. Events have proved its accuracy. While the year has been less disastrous than its predecessor, it has provided excitement aplenty and the industry has, in many instances, had to face additional losses.

"Your soil improvement committee has been carrying on its well-considered and efficient activities. A number of meetings between the state colleges and stations and the fertilizer industry have been successfully conducted during the year. These have proved valuable to the industry and, we trust, have been of help to the colleges and experiment stations. The campaign for higher analysis goods is producing results. The average analysis of mixed goods shipped this spring is appreciably higher than heretofore.

"There is submitted the thought that a business engineering survey of the industry would be a profitable undertaking. Our methods of distribution and of selling are inefficient, but not hopeless if we are frank enough to confess the disability. Other of our methods also call for improvement, and it is my belief that a scientific survey by an impartial source presenting conclusions from a detached viewpoint could not fail to be of value.

"It has for many years been the policy of the association to oppose the imposition of duties on the importation of raw materials entering into the manufacture of fertilizers. In carrying out this policy the association has opposed the imposition of a duty on sulphate of ammonia, nitrogenous materials and potash salts. The protection asked for would only result in giving American producers the opportunity to ask higher prices from the fertilizer manufacturer and the farmer, without adding materially to treasury receipts.

"The most controversial part of the tariff discussion is the proposed duty on the importation of potash salts for fertilizer use. Every red-blooded American would like to see a potash industry developed in this country, provided it could be done along sound and permanent lines. Unfortunately most of the possible producing centers are situated far from the potash consuming sections. Freight rates are excessive, as compared with those in effect from France and Germany. The bulk of the American product would of necessity be concentrated salts, whereas a large proportion of the potash used in mixed goods is in the form of mine run, 16 to 20 per cent salts, which cost at ports from 15 to 18 cents per unit less than the concentrated muriate. The use of those mine run salts also permits a better distribution of potash in the fertilizer mixture, and saves dilution expense.

"It does not seem possible that the American producer can supply this cheaper form of low grade salts in the territory where it is consumed. Aside from revenue reasons there seems to be little justification for the imposition of a heavy duty on potash salts, and it would cost the farmer a pretty penny if the proposed duty were imposed. In inviting congressional attention to these facts the association is co-operating with the American Farm Bureau Federation and the National Grange.

"With the end of the present year the fertilizer industry has completed liquidation of stocks. Plants have been swept clean of old materials. New buying is in order, and for the first time in nearly two years material costs in goods can be figured on a stabilized going market basis. The unknown and extremely important factor in future costs will be demand. The farmer has it in his power to reduce materially the cost of making fertilizers, and thus his cost to him, and that is by increasing the use of them. A return to a normal consumption is the first step. Capital expense used in mining and manufacturing, superintending and selling salaries, insurance and other fixed charges, are directly influenced by the tons put through a plant. Low costs cannot be expected from a plant running 60 to 70 per cent of capacity, and that is the major ailment of the fertilizer industry today—nine of ten million tons of producing capacity and five to six million tons of business.

"All signs point toward increased buying by the farmer during the coming year, and the fertilizer industry may look with some degree of confidence toward a resumption of normal operation, and with some hope of financial rewards instead of losses resulting from next year's work."

Ballou Co. Ships Silica Sand to England

RECENTLY, the Ballou White Sand Co., miners and shippers of Millington silica sand, at Millington, Ill., received an order from an English house for a shipment of the company's Quality dry silica. The needs of this English concern required that the shipment be of the very highest quality. The test showed that the Millington silica answered the purposes for which this sand was to be used. The shipment is already on its way.

The Broken Year and How to Mend It*

By George Otis Smith
Director of the United States Geological Survey

The first stitch in the mending, as advised by the author, is the practical remedy of stabilizing the coal market. He also advises the coal operator whose plaint is "less government in business" to "put more business in business"

THE present lack of public anxiety over the coal situation is not at all novel. The average citizen doesn't get thoroughly warmed up on the coal question until he begins to get chilly. Thus it happens that a midsummer coal shortage is likely to be a lukewarm affair.

Yet disregard of unpleasant facts does not stave off disaster. Paralysis of industry and transportation on a country-wide scale is the natural outcome of a coal shortage if carried to the extreme that can not be many weeks distant. Serious as the present situation is, however, there are fundamental problems more insistent for solution than even the pending differences betwen employer and employee. These basal problems affect the whole coal industry to some degree, but especially the bituminous branch. Clear up the economics of the business and a lasting settlement of labor controversy would become a possibility; leave these questions unanswered, and industrial peace can not be expected to survive the usual two-year armistice.

Coal Business Needs Reform

What coal producers and coal consumers alike need is reform of the business rather than compromise between parties to the controversy, and in this reform it is absolutely essential that the mine worker should co-operate with the mine operator. Two long have the mine owners treated the coal business as private privilege and too long have the labor leaders with no less monopolistic attitude obstructed every move for underground efficiency and economy. The people's coal costs too much because of the mistaken idea that mine owner and mine worker can continue to fight over contracts and rules. Cheaper coal and larger earnings will come when engineering is emphasized more and bargaining less.

In terms of engineering, the coal industry has a bad load factor; translated into human relations, poorly functioning mines mean poorly employed miners. A longer working year would seem at first glance, desirable to mine owner, mine worker, and consumer alike. Why not get it?

The Trouble with Soft Coal Mines

The trouble with our soft coal mines is not so much the broken year as the broken month, the broken week, and even the broken day. The running time is broken into small pieces, for mine operation is not simply seasonal; it is intermittent. In that theoretical mine of the statistician, the average mine of the country, we find November a longer month than June, by 25 per cent, and June longer than April, by 10 per cent, and yet the working time in a normal November is only 19 to 21 days. And irregularity creeps into the working week and the working day, for Friday and Saturday are normally shorter days than Monday. Granted that the workers in other industries suffer the handicap of seasonal unemployment, our problem, and the national problem just now, is the betterment of the working time of coal mines, and especially bituminous coal mines.

That average mine is located nowhere in particular, and the average working time by states and fields shows marked and significant differences. The average year in the Southern Appalachian region is a fourth longer than the average year in the central competitive district. With 215 days as the average year for the whole country we find a 273 day average year in New Mexico, 247 days in Alabama, and 223 days in West Virginia, as against 202 days in Missouri, 197 days in Illinois, and 192 days in Oklahoma. For the soft-coal miner this is plainly not a land of equal opportunity.

Where Are the Leaks?

Markets, quality of coal, mine costs (including wage scales), and car supply are all factors contributing to these differences in mine employment. Unfortunately, we can gage results better than determine causes; we know the industry to be wasteful, but where are the leaks? The lack of efficiency and the losses due to irregular operation are not universal, for many individual mines work 300 days in the year. Indeed, in 1913, when the bituminous mines average 232 working days, one-fourth of the half-million men in the industry were employed in mines that worked 280 days or more, and nearly 50,000 of them in mines that worked 300 days or more. Our problem in industrial betterment then is simply to bring the average mine up to the best; to do that, unfavorable conditions must be replaced by favorable conditions.

Stabilizing the Market

First among methods of mending the broken year is the practical remedy of stabilizing the coal market. Many reforms can begin at home, and my first practical suggestion for bettering conditions of employment at the coal mine will be addressed to the coal consumer. A more regular market for the mine's output is the first essential, and here is the consumer's opportunity to co-operate. You and I need to buy coal at times when we need the coal least. Off-season delivery of coal, even to the small consumer, whose name is legion, will help materially to make the mine worker's June more like his November. Also, each of us should buy of one dealer, not "shop" for coal. If you or I speculate in our 10-ton purchases of coal, how can we deplore the speculative tendency of our coal dealer and the chain of business hazards thus initiated? Is it not plain that the retail dealer who can depend on his regular trade can himself be a better customer of the wholesaler or the selling agent of the mine?

The large consumer can do even more

*Address before the National Conference of Social Work, Division of Industrial Economic Problems, Providence, R. I., on June 26.

to smooth out the irregularities of mine operation by making long-term contracts, even five-year contracts, and providing for delivery to suit the mine as well as himself. Such contracts could be made at lowest prices, for with long-term contracts in hand the mine operator could reduce his costs to a minimum. With such a steady market, full year operation and steady employment would become possible—the mine worker would earn a year's wage, and the public would not pay for idleness. That reform, however, must begin at home not at the distant mine. The consumer must start it.

Idle Days Cost $400,000,000

With market demands more regular it will become even more obvious that the overdeveloped industry must suffer deflation; fewer mines and fewer miners can and should furnish the needed coal. Mr. Peabody as a representative operator admits that one-third of the operating mines represent a burden on the industry, and he suggests their elimination through bankruptcy. Ellis Searles, the editor of the *United Mine Workers' Journal*, admits that 150,000 miners, like one-third of the mines, should be eliminated, and he suggests that they leave the mine for the farm. Mr. Peabody estimates that the idle days of our bituminous mines involve an annual loss to the capital and labor employed of not less than $400,000,000, and I suspect that most of this loss is paid by the consumer.

A longer working year for a reduced force is the only possible method of bringing about the lower wage scale and the larger annual earnings, both of which are generally needed. It is largely by reason of the high unit rate of wages that coal costs too much, and on broad economic grounds it may well be questioned whether the producer should be paid a wage out of all proportion with the wage of the consumer. Can a $5 a day workman afford to buy coal mined by a $10 a day mine worker?

Arouse Public Opinion

To hasten this needed deflation, even though it be accomplished through the working of the law of supply and demand, there must be a better informed and more aroused public opinion. The people need to realize more thoroughly that their industrial life as well as their domestic comfort depends upon coal. This business of mining and distributing coal ranks with the public utilities, and public regulation will surely come as need arises. The words of President Harding, "Deliberate public opinion never fails," expresses a truth as applicable now as in the days of Lincoln.

"More Business in Business"

Whenever public interest is aroused in the coal question, the defensive note of the coal men is likely to be that appeal for "less government in business," an appeal with which I sympathize so far as governmental regulation might drag politics into business. The political danger that really confronts the coal business is that the leaders in the industry will too long be blind to the trend of the times. In this year of the independence of the United States of America, the 146th, the American people are not reactionary—the old ways of doing business are not to be the new ways. Our reverence for the privileges and rights of private business is giving way to a new attitude: We are asking what is private business and what is public business.

Forced to extremes by private disregard of public interest, this tendency in popular thought may even become dangerous, and Secretary Hoover's recent statement to the operators that "if our coal industry does not govern itself it will surely be governed by the public," was a warning of that danger. So I suggest that if "less government in business" is desired, the best means to that end is *more business in business*. Our bet mines are so planned, equipped, and operated as to demonstrate how efficient coal mining can be, and a similar statement can doubtless be made of certain units in the merchandising of coal; yet the average coal mine and the average coalyard are far from being gratifying exhibits of that engineering ability of business thrift which we like to regard as typically American.

How to Adopt Higher Standards

In bringing about the adoption of these higher standards and more business-like practices in the coal business, public opinion must be the force that refuses capital to open or operate unneeded mines, that refuses to pay wages or profits figured on an expectation of one-third idleness and two-thirds work, that encourages off-season purchase and storage of coal by consumers—and above all, we need an enlightened public opinion that puts a ban alike upon the selfish disregard of the interests of the producer of coal by the purchaser, and of the interests of the consumer by both the mine operator and the mine worker. The present unhappy condition of the coal industry is not an aftermath of the war; rather, the blame for most of the evils that burden the coal business and have burdened it for years, must be laid on the common garden variety of blind selfishness. The sharp buying of coal and disregard of contracts whenever the market favors the buyer, the profiteering by the operator or dealer when his turn comes, the collective bargaining by the walk-out as the club—all these bring unnecessary hazards into the business and add useless costs to the product.

The general welfare is tied up with a regular supply of lower-cost coal and larger earnings for those who produce it. And the responsibility for mending the broken year needs to be shared by the many who can help thus to bring about the economic and social benefits arising from coal that the nation's industry can afford to buy, and from mining towns of which the nation needs not be ashamed.

Michigan Mileage Scale Reduced 17 Per Cent

THE Michigan Public Utilities Commission has just handed down two decisions in Docket D-1522, which was an action brought by the Michigan Sand and Gravel Producers' Association for a modification of the order of the commission which went into effect in May, 1921.

This new decision has an effect of reducing the Michigan mileage scale an average of 17 per cent, and also to reduce the carload weight from 100 to 90 per cent of the capacity of the car. Taken in connection with the reductions ordered into effect a year ago, this order will reduce the rates on sand and gravel in Michigan to or below the basis in effect prior to the increase of August 26, 1920.

This is the best decision that has been rendered by any state utilities commission from the standpoint of the producer. Certainly that is the case as to Eastern territory because in New York and Ohio, the only other states in which drastic orders have been made by the commission, the rates put into effect were the rates prior to the increase without the establishment of the mileage scale.

"In Michigan," says Traffic Manager G. J. Bolinder, "we have accomplished the reduction of the rates to as great an extent as was accomplished in Ohio and New York and in addition we have the benefit of the scales, which are as follows:

"First, uniformity throughout the state.

"Second, a rate to and from all points in the state."

In the accompanying tabulation are the new rates in Michigan, which are to be effective July 1, assuming, of course, that action is not taken by the railroads either before the Interstate Commerce Commission or Michigan courts to suspend the commission's order.

MICHIGAN MILEAGE SCALE ON SAND AND GRAVEL EFFECTIVE JULY 1, 1922

Miles	Cents
10	50
15 and over 10	54
20 and over 15	58
25 and over 20	62
30 and over 25	66
40 and over 30	70
50 and over 40	75
60 and over 50	80
70 and over 60	85
85 and over 70	90
100 and over 85	95

Extra for 2-line, 12 cents, and for 3-line, 20 cents per ton. The minimum weight is 90 per cent of the capacity of the car.

Nothing to Sell But an Idea*

Some high lights which reflect the real purpose of the Portland Cement Association. In expanding the market for raw materials the dominating method is to know as much as possible about the adaptability of those materials, declares Mr. Campbell

By H. Colin Campbell
Manager of the Portland Cement Association's Advertising and Publications Bureaus

PROBABLY no one will ever complete a list of all ways and means to expand markets for raw materials. Certainly a dominating method is to know as much as seems possible about the adaptability of such materials. This known, it is evident that one can then direct his attention toward seeing that they are used so that the best results possible will be realized. The ways of using any given raw material may be numerous.

The man who needs mortar to lay cut stone, brick, or concrete block sees nothing that will satisfy his need in the mountain of rock which after being put through a multiplicity of processes becomes portland cement. Yet the mountain of rock has a distinct value because a market has been made for it through the discovery that when put through certain processes it will become one of the strongest binding or bonding materials known.

Portland cement, even after having reached the dignity of a manufactured product, is still a raw material until those who are to use it know and apply the ways and means necessary to most efficient and effective use.

The unqualified statement may be made that no manufacturer, no producer of any raw material, as first defined, can separate or isolate himself from the many enterprises going on about him if he expects success. A careful study will disclose a lead which shows his relation to and interdependence with many other enterprises, seemingly remote from his commonplace individual interests and of vital concern to the ultimate success of his business.

Cement Once a Mountain of Raw Materials

The discovery that a mountain of raw materials could be converted into portland cement is in itself an illustration of the expansion of markets. There are not far from 100 distinct operations that must be performed before a sack of cement can be turned over to a prospective purchaser as a product ready for use. Each one of these operations requires some related operation, the use of some device, the carrying out of some method that calls for machinery, fuel to drive it, laboratory work of a high order to determine quality. In other words, the seemingly simple process of tearing down a mountain and putting it through a sieve, makes and expands markets for a variety of other raw materials in direct ratio to the demand developed for the finished product.

If cement mills were to be shut down because there were no longer any demand for their output, there would immediately follow a reduced market for iron and steel, a great variety of tools, machines, dynamite, etc., necessary to equip and operate such plants. As a result there would naturally follow the loss of a field for the sales efforts formerly directed toward securing purchasers for the product normal to the abandoned industry. In other words, the far reaching effect of continuance or suspension of cement manufacture would soon become evident.

The Association a Voluntary Organization

The Portland Cement Association is purely a voluntary organization. In popular conception it is classed as a "trade association." While there are other associations operating as we do, I think it safe to say that our method of operation is unique in that it has greater ramifications than any organization with which we may be compared.

Practically all of the cement manufacturers in the United States and Canada belong to the association. We have members even in Cuba, Mexico, and South America. That we have these foreign members may seem strange to you when I tell you that the association is not in any way concerned in the commercial aspects of the cement industry. The reason for this membership is due to the far-reaching effect of our educational work and the inestimable value which cement manufacturers place upon it as an aid to stabilizing and expanding the market for their product.

We have 24 offices in different parts of the country. The underlying idea of the association is expressed in that often used, much abused and sometime meaningless word "service." Our headquarters in Chicago is the executive center for all of the activities in which we engage. Each district office is a service organization on a smaller scale, although sufficiently complete to efficiently service its territory. Depending upon the number and intensity of various campaigns we may be engaged in, our staff averages around 300. Most of our men are technically trained—usually civil engineers. Also most of them are, or soon become, "peculiar" engineers in that they are able to keep their technical or professional training from interfering with the ability to put their ideas and aid in such form as to make popular consumption easy. They are trained in promotion. They are salesmen who have nothing to sell but an idea, which is "Concrete for Permanence."

Our headquarters, as well as the district offices, is departmentized. Specialists are delegated to the classes of educational promotion to which they are best fitted. Agriculture, building construction in its broadest sense, sanitation, highway engineering, from the simplest to the most stupendous structures required in any given field, are all reduced to terms of concrete.

The Backbone of the Scheme

Probably the backbone of our whole educational scheme is in our Structural Materials Research Laboratory, operated jointly and in co-operation with the Lewis Institute, Chicago. Here a large corps of trained men are engaging in research work on the uses of cement and concrete. Since 1916 considerably more than 100,000 chemical and physical tests

*Abstracted from Mr. Campbell's address before the First National Industrial Advertising Conference at Milwaukee on June 13.

have been made in this laboratory solely to determine how best to use concrete, as well as how not to use it—in discovering and establishing the possibilities of cement as expressed in concrete construction.

Notwithstanding the association is 20 years old—and during all that time has been attempting to further knowledge on the use of concrete—within the last seven or eight years we have learned more about how, and how not, to use it than was known in all the years before.

The evident advantages of concrete construction were early recognized and tempted many to write their own specifications for using the material, with the natural result that cement—the principal ingredient—was discredited because of faulty use. Practical guidance, based on scientific knowledge and established facts, was necessary to prevent abuse of a worthy material.

Until within comparatively recent times, nothing was known as to the effect which clay and other impurities as an admixture with the sand and pebbles used in concrete might have on the strength of a finished structure. Studies have been made in our laboratory on the effect, size and grading of aggregates have on concrete; of using different types of aggregates; of impurities in aggregates; of powdered admixtures in portland cement such as coloring matter and hydrated lime used for a definite purpose; the effect of impure mixing water such as impurities caused by industrial waste, etc.

At first glance, these studies might have but remote connection to expansion of the market for cement. However, as an example, our studies on the effect of size and grading of aggregates as related to a concrete mixture have been most forcibly illustrated on a piece of concrete highway construction now in process in the Imperial Valley, California. At the quarry where the aggregates were being obtained methods employed in screening the crushed stone for the concrete mixture caused a waste of 35 per cent of the materials taken from the quarry.

One of our field engineers, who was rendering the usual co-operative service to those in charge, suggested that a change in the methods of screening, based on our laboratory tests, would considerably reduce this waste. His suggestion was adopted with the result that a waste of only 15 per cent followed the changed methods. What this meant to the taxpayers was that instead of costing $1 a ton to prepare, the stone costs 42 cents—$30,000 were saved, which made it possible for the community to build an extra mile of concrete road and at the same time made a market for 3500 bbl. more of cement.

More Educational Work

Among the classes of educational work carried on are lectures before agricultural colleges, farmers' institutes, engineering colleges and universities, co-operation with county agents, architects, engineers, contractors, building commissioners, having to do with revision or writing of building codes, vocational schools in which we endeavor to establish simple courses in manual training through the use of concrete, etc.

You will also find our field engineers on many a piece of concrete construction serving in an advisory, consulting or inspecting capacity in co-operation with the engineer, contractor or architect under whose immediate supervision the project is going on. We also have a motor truck with complete concreting equipment giving demonstrations in the actual "how" traveling throughout the country.

We have assisted many aspiring men to go in the contracting field specializing in concrete construction. We have promoted through educational work a higher standard for building codes in many cities and are continuing this work everywhere that our aid is asked. The result is certain to be expressed ultimately in economies of construction, more highly fire resistive construction, consequent reduction of natural fire losses—a distinct service to the public, an establishment of a certain amount of resultant good will and an extension of the market for cement.

We distributed several million booklets last year discussing the advantages of the use of cement in construction in many fields. "Concrete on the Dairy Farm," "Concrete on the Hog Farm," "Concrete Around the Home" are typical titles. We have booklets devoted strictly to concrete construction in specialized structural fields. These booklets are continually revised by incorporating the latest information disclosed by study, research or experience and are in that way kept up to date.

We use miles of motion-picture films. We have a film showing the numerous processes involved in the manufacture of portland cement. Hence it does not require a high order of intelligence to realize a sack of cement represents the combined expense or cost of many operations, one of which, for example, is the use of 50 lb. of coal.

The advantages of paved barnyards are displayed through the medium of animated cartoon films circulated in rural communities. We have many reports showing that after a local cement dealer had displayed one of our animated cartoon films in his community he sold within a week or 10 days cement for several concrete feeding floors. We have no connection with cement dealers other than placing at their disposal motion-picture films or other educational matter which they may wish to use in the immediate furtherance of cement sales. Occupying this unique position with relation to the industry we can devote our whole time and talent to further expansion of our educational methods and to the development of new ones.

Few people seem to take into account at times one vital fundamental that would put their 90 per cent success in the 100 per cent rank. Do those who produce sand and gravel and crushed rock—those materials which we refer to as "aggregates"—always remember what a business the discovery of cement made out of these materials and how rapidly the increasing use of cement in the form of concrete construction is expanding the market for these materials?

Protecting the Market's Purchasing Power

Concealed within our slogan, "Concrete for Permanence," is the idea of protecting the purchasing power of the market. The cement manufacturers' market is the whole United States, because every human being, whether he knows it or not, is dependent in some way upon cement as expressed in concrete construction. It is practically a universal building material; it has been established as the highest type of fire resistive construction. It has been shown to possess strength and endurance unexcelled, because, as we are wont to say, "the maintenance is built into it." It is building maintenance into any product that makes that product capable of rendering the highest degree of service. Although this may make the product cost more in the beginning, it will prove far less expensive to the purchaser or user in the end. It is such products that build that capital stock of inestimable worth known as "good will" because they conserve the purchasing power of their market.

Co-operative Advertising

In my estimation, there is too little co-operative advertising. Even among the large number of trade associations, of which there are several hundred active ones, there are only a few which advertise regularly. True, from the standpoint of joint advertising, there are problems sometimes difficult of solution to the satisfaction of the many members constituting an association. But if the individual members of such organizations could only be convinced of the desirability of subordinating trademarks, of suppressing petty differences and of uniting in a fundamentally sound campaign to reach one objective, namely, favorable public opinion, they would find a great deal of the resistance encountered in common sales methods overcome.

Advertising as an institution is old, but old as it is, it is nevertheless young. Often little can be predicated as to the results which any kind of advertising may be expected to produce. The objective sought by all advertising is the cultivation of favorable public opinion, which is another way of saying building good will, and hence sustaining and expanding a market.

Any publication which has a circulation of character, no matter how small that circulation may be, has a definite value as an advertising medium. The kind of appeal as represented by copy should be worked out very carefully after it is certain the objective to be reached has been thoroughly understood. A good many people are sincere in thinking that they want a certain thing or desire to attain a certain end, when in reality they do not because they have failed to give their motives and desires proper study and proper co-relation.

Trade papers are immensely valuable to the advertiser who wishes to reach the field they cover with least possible cost and waste. General magazines are of immense value if used persistently over a long campaign with editorial copy that can reason and explain, and thereby round out a course of education. Neither of these classes of publications, however, so long as established methods of making them prevail, can occupy the definite field and value of the newspaper.

Magazines worthy of use are generally of national or large territorial circulation. It is impossible to concentrate appeals in narrowly prescribed territories through their use.

Through newspapers concentration can be secured wherever desired and by a well-chosen schedule of newspapers zones of circulation can be made to overlap and effective national circulation secured if desired, while the institutional appeal can at the same time be combined with local intensification.

$190,000,000 for Road Construction

FEDERAL aid for road construction will be continued as a result of the authorization of additional appropriations amounting to $190,000,000 carried by the postoffice appropriation bill signed by the President on June 19. For the fiscal year beginning July 1, $50,000,000 is authorized, and $65,000,000 and $75,000,000, respectively, are authorized for each of the two succeeding fiscal years. In addition, $6,500,000 is authorized for forest roads for each of the two fiscal years beginning July 1, 1923, and July 1, 1924. The funds will be administered by the Secretary of Agriculture through the Bureau of Public Roads.

The apportionment to be made to the various states is approximately as follows:

	Fiscal Year Ending 1923
Alabama	$ 1,035,614
Arizona	702,188
Arkansas	836,095
California	1,641,399
Colorado	894,117
Connecticut	320,599
Delaware	243,750
Florida	591,217
Georgia	1,331,972
Idaho	625,691
Illinois	2,164,187
Indiana	1,305,904
Iowa	1,401,915
Kansas	1,401,521
Kentucky	944,786
Louisiana	664,660
Maine	463,440
Maryland	427,086
Massachusetts	730,784
Michigan	1,499,688
Minnesota	1,415,731
Mississippi	863,271
Missouri	1,632,086
Montana	1,031,257
Nebraska	1,054,126
Nevada	635,624
New Hampshire	243,750
New Jersey	628,581
New Mexico	793,216
New York	2,464,299
North Carolina	1,139,556
North Dakota	776,476
Ohio	1,882,003
Oklahoma	1,168,226
Oregon	788,443
Pennsylvania	2,265,969
Rhode Island	243,750
South Carolina	707,492
South Dakota	802,707
Tennessee	1,098,461
Texas	2,950,115
Utah	566,278
Vermont	243,750
Virginia	971,219
Washington	735,806
West Virginia	534,906
Wisconsin	1,263,211
Wyoming	623,078
Total	$48,750,000

These funds must be matched by the states and will be administered subject to the general provisions already in force.

The new legislation reduces the maximum participation on the part of the government from $20,000 to $16,250 per mile for roads constructed with the appropriation for the next fiscal year and $15,000 per mile thereafter. Bridges over 20 ft. in span may be considered as separate projects to which this limitation does not apply. In states where more than 5 per cent of the area is unappropriated public land provision is made for an increase in the amount per mile.

Important provisions of previous acts under which large funds have been successfully administered are applicable to the new funds. States must maintain adequate highway departments. Funds to match Federal aid must be placed under the direct control of the state highway department. The type of surface constructed must be adequate for the traffic anticipated, with reasonable grades, curves, and other features. States must obligate themselves to maintain all Federal aid roads constructed, and in case this is not done any Federal funds available for new projects may be withheld until they are put into satisfactory condition. All Federal aid funds must be spent on a connected system of roads consisting of not more than 7 per cent of the total mileage in each state and divided into primary or interstate roads and secondary or intercounty roads.

Plans for the proposed system have been received by the Bureau of Public Roads from all but eight states, and the state systems are being co-ordinated so that when joined together they will serve the best interests of the whole country. In the meantime only projects certain to be on the proposed system are being approved.

The new appropriation comes at a time when several states are nearing the limit of funds available. The authorization of funds for three years in advance will be of great benefit to all states in that it will permit them to lay their plans for some time ahead.

What the new funds will mean to the country can be judged by the use that has been made of the $350,000,000 previously appropriated. On May 31, 17,000 miles of road had been completed, and, in addition nearly 14,500 miles were under construction. Federal aid roads in all stages total nearly 38,700 miles, involving over $287,500,000 of Federal aid. To match this fund, the states have appropriated approximately $380,000,000, making a total of $667,500,000.

All types of road have been constructed with Federal aid to meet the varying conditions. The average cost per mile has been $17,120, and Federal aid has amounted to 43 per cent of the total cost.

It is estimated that the $190,000,000 lately authorized will result in the construction of more than 25,000 miles, which added to the 46,000 miles that is expected to result from previous appropriations makes a total of 71,000 miles, or nearly 40 per cent of the estimated 180,000 miles of road in the system of Federal aid roads now being outlined.

"15 Per Cent Tolerance" Not Responsible for Increase of Small Pits

SOME charges have been made that the 15 per cent tolerance through the ¼-in. screen for coarse aggregate has been the cause of inducing a number of small plants to go into business, competing with the larger established plants, says Secretary Yeoman of the Indiana Sand and Gravel Producers' Association.

"The assertion is undoubtedly far-fetched. The real cause for the development of the local producing plant is high freight rates. The proof of this is demonstrated where numerous local pits have been developed for both gravel and stone to produce water-bound road materials, where the 15 per cent tolerance is not a factor.

"The same development of local plants has gone on in counties where the above tolerance has never been adopted, as in those where it has. The majority of producers of clean and screened materials find it just as difficult, from a mechanical standpoint, to make 15 per cent aggregate as 5 per cent, but are able to conserve a larger percentage of the deposit under the greater tolerance."

The Right Use of Colorings for Cement

COLORED articles in cement mortar or concrete has always been somewhat unsatisfactory. *Zement*, a foreign publication, gives the following information as to proper colorings for cement, especially to concrete tiles:

Reds—The best red colors are produced by red bole, a natural oxide of iron whose tint has been developed by levigation and calcination. It is largely used as the basis of red oxide paints.

Several varieties of iron oxide are available; they vary considerably in composition, according to the amount of combined water present. The color does not appear to be directly related to the chemical composition, but rather to the size and density of the particles.

One of the best forms is a byproduct in the manufacture of sulphuric acid from calcined pyrites, but for use with cement it should be free from sulphurous acid, which is a common cause of scum and discoloration.

Yellows—Ochre is the chief material used for the production of a yellow color in cement work. It is a weathering product of ferruginous felspar and of variable composition. It is usually kept for several years in the open, then ground and levigated so as to separate coarse impurities. Umber is a darker color, but in many respects similar to ochre. Both ochre and umber reduce the strength of the cement mortar or concrete.

Zinc yellow (zinc chromate) is sometimes used as a yellow pigment, but its price is generally too high for its extensive use in concrete or cement work.

Blacks—There are two chief sources of black pigment suitable for use with cement—namely, manganese black and carbon black. Manganese blacks consist chiefly of manganese dioxide, while carbon blacks consist of slate, black shale or some form of soot, such as lampblack.

Ground coke is also largely used as a black pigment. All these materials must be particularly finely ground. Usually manganese black is more serviceable than carbon black, but is more costly.

Greens and blues are made from ultramarine with some other pigment, such as chromium oxide; ultramarine increases the strength of the cement on account of the free (colloidal) silica and aluminum present which gives it hydraulic properties.

The best green pigment for cement mortar is chromium oxide prepared from a mixture of potassium bichromate and sulphur; it should be bought as its preparation is difficult.

Lime green is a magnesium alumino silicate (augite) containing some iron and of a variable composition. Most green cement mortars or concrete fade on account of the oxidation of the iron present.

Lime Campaign in New York

LIME manufacturers, officials of the State Farm Bureau Federation, of the State College of Agriculture, and of the State Department of Farms and Markets in New York state are working together in a campaign to increase the use of agricultural lime. This is the first time such satisfactory co-operation has been worked out between these big private and official institutions.

The campaign is not only to increase the use of lime on farms alone. The committee representing the four interests is investigating ways and means of making lime more easily available to farmers. Transportation rates and other items are being studied. It may be possible that pooled orders will be sought in each county, making shipments from the nearest point and thus securing economy.

Some hesitation in using lime has been shown by farmers. Experiment has shown, however, that lime at present prices is an economical investment, even when present low prices of farm products are taken into consideration. State College officials find that farmers can profitably double their use of lime and profitably double it again this fall.

Use of lime in this state has decreased steadily during 1916, 1917 and 1921, for which figures are available. In 1916 164,000 tons were used, in 1917 about 154,000 tons and in 1921 about 135,000 tons. The chief reason for this decrease is higher freight rates—40 per cent in August, 1920. Since then a few minor reductions have been made. General depression was a minor factor.

Figures prepared show that New York needs lime on 88 per cent of its farm lands. The estimated requirements are 18,000,000 tons, or 6,000,000 tons a year for the next three years. Calcium lost from the soil is equivalent to from 500 to 800 lb. of limestone an acre each year. This means New York soils need the equivalent of 3,000,000 tons of limestone every year.

On this basis, from 2000 to 3000 lb. are needed for a four-year rotation after the first and heavier application. On moderately acid soils, the lower figure, 1 ton in four years, produces excellent clover, but in other sections applications of 1½ tons will be profitable.

Instead of 2000 lb. an acre in four years, or an average of 500 lb. an acre a year, the 135,000 tons used in 1921 are equivalent to an average of 34 lb. of limestone an acre on 8,000,000 acres of New York soils. The quantity is insignificant and of little value. The figures were prepared by A. F. Gustafson, of the Department of Agronomy of the State College.

Grindstones and Pulpstones Produced in 1921

THE output of grindstones and pulpstones in the United States in 1921 amounted to 26,340 tons, valued at $1,227,322, according to figures reported by the producers to the United States Geological Survey. This was a decrease from the output in 1920 of over 50 per cent in quantity and of 28 per cent in value. The grindstones produced amounted to 16,310 short tons, valued at $477,259, a decrease of 63 per cent in quantity and 61 per cent in value.

The pulpstones produced amounted to 10,030 short tons valued at $750,063, an increase of 16 per cent in quantity and 63 per cent in value. The demand at paper mills, which were very active late in 1920 and early in 1921 and which during and after the war could not renew their supply of English stone, increased the market for domestic pulpstones. If the depression that followed this activity continues there will probably be a considerable decrease in the output of pulpstones in 1922.

The imports of grindstones and pulpstones were valued at $81,880 as against $77,046 in 1920. The exports of grindstones were valued at $281,976 as against $424,322 in 1920.

"The Mixer" Book Reviews

IN a recent issue *The Mixer*, the bright and newsy organ of the Hercules Powder Co., has a department of book reviews that are worthy of much interest.

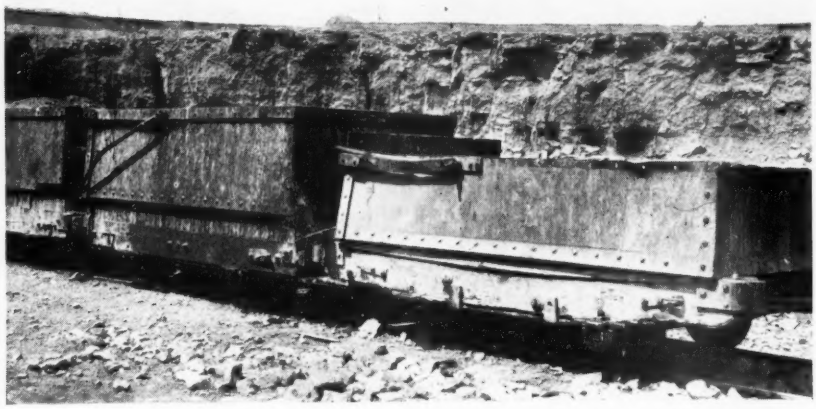
Commendation is accorded Doctor Mellor, an English chemist, for his work in compiling and editing two volumes on "A Comprehensive Treatise on Inorganic and Theoretical Chemistry," which includes allusions to the rise of the Phlogiston theory and the Ionic hypothesis. There is a sharp fling at one Wingfield-Stratford for his glib dogmatizations on psychological questions and his irritatingly priggish attitude in his book, "The Open Road to Mind Reading." Approval is given to the U. S. Bureau of Mines Schedule No. 17 on "Explosives." And there are comments on other literary works running from the "featherweight fiction" of Harold MacGrath to "The Health Care of the Baby," "Lives of Poor Boys Who Became Famous," and "Overhead Expense and Percentage Methods." All in all, *The Mixer's* editor has provided two very interesting pages for his readers.

Hints and Helps for Superintendents

A Made-Over Quarry Car

WHEN you can make over a worn-out quarry car so that it is stronger than the original, that's the thing to do. At least, Tom Madden, superintendent of the Superior Stone Co., near La Grange, Ill., believes this, and he practices what he believes.

The right-hand car in the illustration shows the type of car in use at the quarry. When several of these became so bad that they would not operate satisfactorily, Mr. Madden set out to find a way to make use of them. The principal cause of trouble was the iron floor of the car—continual dumping of rock into the car had bellied out the bottom until it scraped the axles or on protruding stones in the road bed. Of course other parts of the car were worn out also.



At the right is one of the old cars; at the left the rebuilt cars, stronger than the original ones

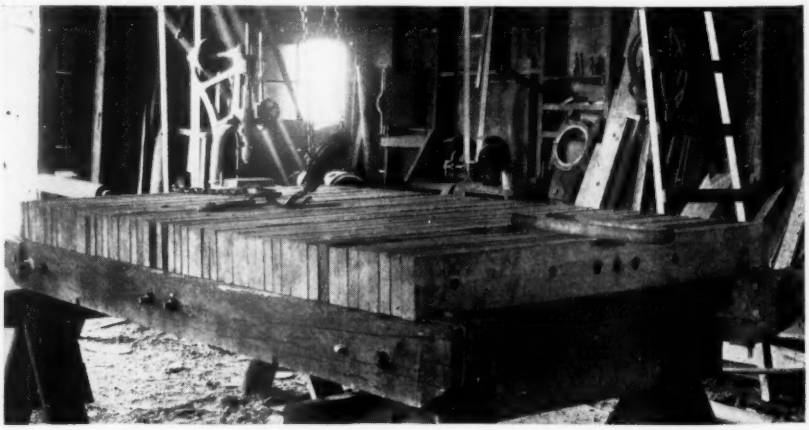
Straightening the bottom plates is accomplished in this ingenious way

So car building, or rebuilding, was started in the shop. One of the illustrations shows a car under construction. Two 6x8-in. stringers a little longer than the car body are separated by three 6x8-in. stretchers, and six tie rods of ¾-in. iron rod, one on each side of each stretcher, make the frame rigid and strong. On the frame are nailed 1x6-in. planks on edge, as the illustration shows, and this makes a solid support for the iron floor to rest on. An iron connecting hook is inserted in this wooden floor. The old axles and wheels can be used.

Now the old iron car body, where it was not too badly worn, could be put back on the car frame except for the bellied floor. Of course that would not go. For a time the quarry superintendent was at a loss to know what to do with this misshapen floor.

Finally he hit upon the idea of using the steam shovel. As shown in the illustration, a flat place was cleared beside the shovel, the old car bottom placed bottom up on this flat place, and the bucket lowered so the teeth could be drawn backward over the plate. A few skillful backward strokes of the bucket produced a plate that was practically smooth and flat once more; it could be used again as a car bottom, and on the home-made solidly built frame this reclaimed bottom would last several times as long as it did in the original car.

Nearly a dozen cars have been so reconstructed, and the others are being made over as rapidly as the old ones require reconstruction.



The quarry cars are rebuilt in the shop right at the quarry. The construction is simple but strong, as the accompanying description explains

Some Practical Belting Hints

EVERY belt ply should have at least 2 in. of pulley diameter to secure full capacity and reasonably long life. A single leather belt may be considered as the equivalent of a four-ply fabric belt, and a double leather belt equal to a six-ply fabric belt.

It is good general practice to favor width over thickness in a belt. It is better to use a light double leather belt a trifle narrower than a single belt on flanged or stepped pulleys. A double is less likely to climb, step or flange, will run truer, and shifting will not get it out of shape so easily. Single leather belts should not be over 8 in. wide.

Except over pulleys under 6 or 8 in. in diameter, use double belts for heavy work. For pulleys under these sizes, extra heavy single or light double may be more economical. If good results are not secured

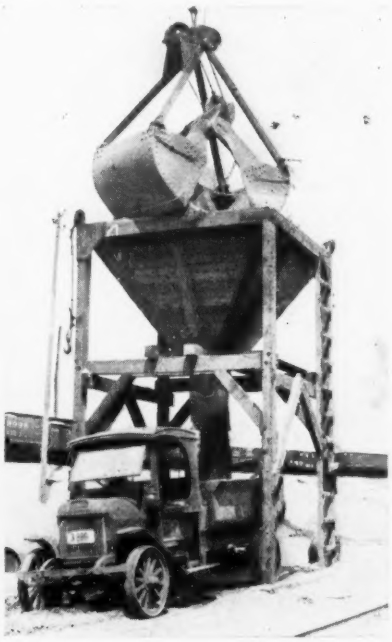
a good dressing, it may be concluded that by keeping belts at proper tension and using the belt is not heavy or wide enough. Pulleys should always be wider than the belts. Pulleys also should always be as large as conditions will permit. More power is obtained and the life of the belt is prolonged. Operate belts with slack side on top. This gives greater power by increasing the arc of contact.

These hints are given in the Flexible Steel Lacing Co.'s catalog.

Unloading Barges by Revolving Crane

SAND and gravel at the Keystone Sand and Gravel Co.'s shipping point in Pittsburgh are unloaded from barges by a revolving crane on shore either to cars direct or to large ground storage piles from which it is rehandled in loading.

A considerable truck trade in sand and gravel has grown up at this point, and to facilitate loading from ground storage without additional handling equipment a wooden hopper was constructed as shown in the illustration. The clamshell bucket of the



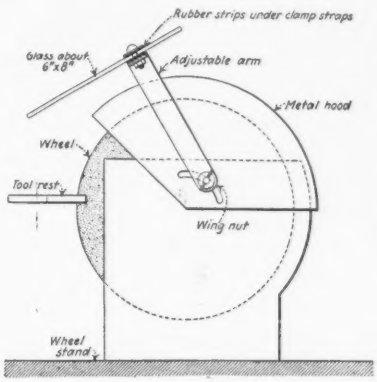
The canvas strip around the hopper opening prevents gravel from shooting over the side of the truck

crane could pick up a load, drop it into the hopper, and the truck waiting underneath would receive the load. No gate was needed in the hopper.

This worked well except that if the load were dropped little to one side of the center of the hopper, the momentum of the material sliding down at an angle carried some of it beyond the edge of the waiting truck. To correct this a strip of canvas about 2 ft. wide was nailed around the opening of the hopper and allowed to hang down as the illustration shows. The effect of this canvas in retarding any side motion to the falling sand was just what was needed; it prevented any of the sand or gravel from spilling over the sides of the truck.

Glass Shield for the Emery Wheel

THE glass shield shown in the accompanying illustration has been found to be of considerable value in protecting operators of emery wheels, says W. J. Tait in *Engineering and Mining Journal-Press*. It obviates the use of goggles, with all their attendant troubles, such as broken parts, dirty lenses, and the general dislike manifested toward them.



Glass shield to protect emery-wheel operator

In addition, the operator cannot inhale the particles thrown up by the wheel. This is a greater menace than is ordinarily supposed, as large numbers of these particles are not visible but show their presence by pitting the shield.

The glass used is a piece of plate from a broken windshield, and all the material is usually available in the ordinary shop. By mounting the glass in a hinged holder, it can easily be pushed out of the way when desired.

Various adaptations can be made so that the shield will work without interfering with the usual operations in a shop.

Mixing Two Sizes Easily

WHEN a mixture of two stone sizes is wanted at the Le Roy Lime and Stone Co., the two sizes are drawn from adjacent bins through openings in the adjoining corners. These openings are only the thickness of the partition apart; the illustration shows how they deliver into the same spout and are chuted to the car below.

Any proportion of the two sizes can be obtained by varying the openings from

A simple gate and chute arrangement makes it easy to obtain a mixture of two sizes

the two bins. There are two loading tracks, and trucks may load also from the bins over either loading track.

Structural Slate for School Buildings

A NEW chapter, entitled "Structural Slate for School Buildings," has just been issued by The Structural Slate Co., Pen Argyl, Pa., the material being prepared by the Structural Service Bureau of Philadelphia. It is devoted entirely to the many uses of slate in educational buildings, with numerous drawings, illustrations, descriptions and specifications. The information is presented in such form as to make the data readily accessible to architects, boards of school directors and constructors. This publication is one of a series of chapters on structural slate being prepared by the Structural Service Bureau. Copies of any of these chapters may be secured by writing direct to it.

An error in the account of the economical stripping methods of the Palmer Lime and Cement Co., appearing in the issue of June 3, has been corrected by Mr. King of that company. The excavator, with two men operating it, removes 350 to 400 cu. yd. per day instead of 300 as stated, and the electrical power cost to operate the motor runs about $2 for a 10-hour day. Four-yard instead of 3-yd. cars are used for loading and hauling.

Developing California's Gypsum

A report by F. J. Griswold tells of its possibilities. It is planned to start soon the erection of a plant and railroad

PRESENT plans indicate the early construction of a plant to develop the gypsum deposits of the California Gypsum Corp., located in the Imperial valley in Southern California. F. J. Griswold, vice-president and general manager of the American Gypsum Co. of Port Clinton, Ohio, returned about a month ago from an inspection trip of the California properties made on behalf of the California Gypsum Corp., and his report indicates great possibilities for this development.

The company has been organized by about 100 business men of Sandusky, Port Clinton, Toledo, and Cleveland, and as a result of Mr. Griswold's report a mill and railroad are planned to be built as soon as the financing is completed. It is hoped to start construction by September.

The dome at the left is practically pure gypsum. The tiny figures of two men indicate its size. At the right is F. J. Griswold, an authority on gypsum, who believes that 40 men and a modern plant can produce here as much as 280 men produce at his Port Clinton, Ohio, plant

The three deposits are located about 16 miles northwest of the town of Dixie Land on the San Diego and Arizona Railroad. The deposits and their possibilities are best described in the words of Mr. Griswold's report:

"The deposit nearest the railroad covers fully 160 acres and in some places rises approximately 275 ft. above the base and will average from 150 to 200 ft. high and how far it extends down into the earth no one knows, but I saw gullies that were more than 30 ft. below the base with solid gypsum still going below base of gullies. This deposit has a number of gullies extending far up into the deposit and in some places great cracks, all of which show solid gypsum—indicating that the entire deposit is one solid mass of gypsum from top to bottom. Tunnels have been driven in several feet, also heavy charges of dynamite have been exploded and tons of rock have been blasted from side of hills and in each case solid gypsum only could be seen. If this deposit is solid gypsum as the evidence indicates, there is enough gypsum rock in this one deposit to supply the largest mill practical to operate for hundreds of years. But in addition to this deposit there are two more, one of which is less than one-half mile and this deposit is larger than the first. There is still another deposit less than 1½ miles from the second and this deposit is as large as the second. It is possible to work up all three deposits without changing the crushing plant, but the time of needing any more gypsum rock than there is in the first deposit is so far distant that the question of using the second and third deposits can be left to future generations. However, should it be deemed advisable to use rock from the second and third deposits, this can be done.

"There is no apparent variation in the quality of rock of the three deposits, and it is reasonable to assume that prior to the volcanic eruptions that very evidently brought the deposits to the surface the three were one continuous deposit which was broken into three deposits separate from each other by short distances.

"Samples from these deposits tested by calcination showed highly satisfactory results. In fact, some of the tests produced a calcined plaster that surpassed in its extremely white color, with two exceptions, any samples seen, and only one of these could possibly come in competition. Gypsum rock from these deposits will make the highest quality of molding and casting plaster (that is so much in demand for ornamental work), plaster of paris and dental plaster, Keene's cement, and if manufactured under experienced supervision in wall plaster will produce a quality equal, if not very much superior, to any now on the market in the territory where it will be sold. In addition, the extreme white color of the ground raw rock will cause a demand by manufacturers using such material and on account of its purity as gypsum, cement manufacturers will not need to use as much as where it is less pure, and its purity will also make it a better fertilizer for alkali lands.

"The analysis of different samples taken from different places showed practically the same—making the manufacturing of the finished product not only quite sim-

ple but also making possible a very low manufacturing cost. The analysis of the crust or dirt on the surface showed that it was 91 per cent pure as gypsum and the other samples showed purity as gypsum from 96 to 99 per cent.

"One sample secured after a considerable search for anhydrite, on analysis proved to be, but such samples were little in evidence at the deposits.

"The location of the nearest deposit to the main line of the S. D. & A. R. R. is approximately 16 miles, consequently some way would have to be provided to transport rock to a point on the road, and while several methods could be used, the practical one is a railroad. The first 12 miles of this road would be at a very low cost, and the last four, owing to the nature of the land, would cost considerably more, but the average cost would not be high.

"A standard gage road should be built and equipment furnished to operate electrically, inasmuch as the operation of the quarry and crushing and grinding machinery should be by electric power, as well as the lighting, cooking, and heating in employes' residences and the operation of any other power machinery which would be installed.

"Shipments of crushed rock and land plaster can be made direct from quarry to customers. All rock to be manufactured into stucco, plaster of paris, Keene's cement, wall and plaster board, gypsum partition blocks, or other products will be crushed at the quarry and shipped to mill site on S. D. & A. and stored on grounds in such quantities as conditions justify. Such rock is ready to put through the manufacturing process as business requires.

"Conditions justify building the plant for completion of the process of manufacturing the crushed gypsum rock into the various products to be made, at a point on the S. D. & A. approximately 12 miles from crushing plant where a very desirable mill site can be had as well as a town site for employes' residences. An abundant supply of water can be secured from wells and from irrigation canals not far distant. All employes other than those residing at the quarry would live at the town site at or near mill where it would be necessary to operate a store or commissary and also to provide necessary inducements to keep employes satisfied and contented. The bulk of labor employed would be Mexicans, but it would be necessary to have some Americans both at the quarry and at the mill.

"The extreme heat which prevails at times in this locality is the only serious objection to locating at this point. During extreme hot weather operations may be carried on by commencing late in the afternoon and continuing through night until about 9 or 10 o'clock in the morning. As the plant will be electrically lighted, this can be done here as at many other places where plants operate 24 hr. a day.

"All shipments east must be by rail over the S. D. & A. to El Centro, at which point delivery will be made to the Southern Pacific railroad, which connects with practically every large city in California as well as many in adjoining states and which has connections with all railroads in that territory. All west bound shipments will go west over the S. D. & A. to San Diego, where connections can be had with the A. T. & S. F. railroad or by boat to all points on the Pacific Coast or foreign countries.

"The present avenues are open for the sale of gypsum products: Wall plaster for building construction; plaster of paris for building construction; wall and plaster board for building construction; gypsum partition blocks for building construction; gypsum roof tile for building construction; Keene's cement for building construction; crushed gypsum rock to portland cement manufacturers, and ground gypsum rock to be used as a fertilizer, particularly on alkali soils.

"Practically no serious consideration has been given to the development of the agricultural gypsum or fertilizer business in this territory. Reports indicate that Japan's requirements for cement manufacture is approximately 30,000 tons annually, now supplied by a low grade from China.

"There is also a possible chance to dispose of a considerable amount in the Hawaiian Islands to sugar cane growers and a possibility of developing a trade along the Mexican coast, and with South American countries, all of which can be supplied from the Port of San Diego, Calif."

Another Oakfield Gypsum Plant

A NEW gypsum plant is now under construction at Oakfield, N. Y., for the Oakfield Gypsum Products Corporation, a newly formed company. The new plant is principally to supply stucco to the three dealer companies whose owners are principally interested in the new organization. The officers of the new company are W. K. Squires, of the Paragon Plaster Co., of Syracuse, president; E. L. Merriman, of the Paragon Plaster Co., of Scranton, vice-president and treasurer, and J. L. Hughes, of the American Hard Wall Plaster Co., of Utica, treasurer.

Mr. Squires and Mr. Hughes recently returned from a trip through Western gypsum plants, where they report they were very cordially treated. They visited plants in Fort Dodge, Grand Rapids, Port Clinton, and other places.

The steel work of the new plant is just being erected. The mine shaft was completed last fall, and the entire plant will probably be in operation by the coming fall. A rotary unit to produce annually 30,000 tons of stucco is planned.

Investigating Aluminum-Alloy Foundry Sands

THE Bureau of Mines, co-operating in a general research of all foundry sands, organized by the American Foundrymen's Association and the National Research Council, is collecting data on sands for molds and cores in aluminum-alloy foundry practice. There is pressing need of collated information on sands used in aluminum-alloy founding, and hopes to aid in disseminating knowledge on the subject.

A questionnaire is being sent by the bureau to aluminum-alloy foundries in the United States in order to obtain data to be used in the preparation of a report. It is possible that some foundries of this kind are not upon the bureau's mailing list, and such plants are asked to apply for the questionnaire. While the replies will be summarized for publication, the contents of individual communications will be held strictly confidential. Communications in regard to the matter should be addressed to R. J. Anderson, metallurgist, U. S. Bureau of Mines Experiment Station, Pittsburgh, Pa.

Lower Rates for Alabama

SHIPPERS and buyers of sand and gravel in Montgomery county, Alabama, are to get lower freight rates in carload lots between Montgomery and Dothan. The Alabama Public Service Commission has made a reduction from approximately $1.26 per net ton to 90 cents per ton of 2000 lb. In addition, a provision is made for reparation.

The order was issued following the hearing of a citation by the commission calling upon the Atlantic Coast Line Railroad to show cause why just and reasonable rates should not be made to apply to movements of sand and gravel from Montgomery to Dothan.

Drop in Limestone Prices

IT is announced by the Knox County (Mo.) Farm Bureau that a substantial drop in price for limestone for soil use has been made, due in part to lower freight rates as well as a cheaper quarry price. The material offered is of good quality, averaging 98 per cent calcium carbonate. It is to be shipped from Hannibal.

The price laid down at all points on the Santa Fe is $2.56 a ton; at Knox City $1.91½, at Edina $1.99½, at Hurdland $2.03½, at Novelty $2.47½. At these prices the material can be very profitably used all over the county and farmers should plan to make use of a large quantity of it, says County Agent Shaffer.

Quarried from Life

By Liman Sandrock

The President of the National Crushed Stone Association

IN the halcyon days of our early youth, down New England way, our dear mothers, when chiding us for our delinquencies, usually wound up by saying: "My boy, you'll never be president if you don't mind your P's and Q's." While it is true that only 29 "boys" ever attained this supreme honor, a few of us have attained presidencies perhaps far surer in their security and undoubtedly better fitted to our attainments.

Take the case of W. Scott Eames, president of the National Crushed Stone Association—he's a sure-enough president, isn't he? He was born in West Haven, Conn., and has made that state his home for some 50 years. For many years he has been a member of the firms of B. F. Savage & Co. and the New Haven Upholstering Co.—always in the manufacturing field up to 1909. Then through his friend Mayor Rice of New Haven, he was persuaded to accept the post of director of public works, which he held until 1914.

Then the New Haven Trap Rock Co. took over the Totoket Trap Rock Co. It had never produced any stone—just acquired the Totoket mountain and some 1100 acres. From the legislature they got the right to build the Branford Steam railroad, a subsidiary of the New Haven Co. When this property was investigated by Hayden, Stone & Co., of New York and Boston, D. A. Blakeslee and Clarence Blakeslee of that company found that the property was able to produce and sell trap rock in New England and New York. D. A. Blakeslee became president of the New Haven Trap Rock Co., Clarence Blakeslee its treasurer, and Mr. Eames was made the general manager.

Construction work began immediately, the North Branford quarry was developed, the railroad built, the terminal and one-mile tunnel completed, and all was ready to begin operations in March, 1919. Mr. Eames had already resigned as director of public works.

Mr. Eames' company was a member of the National Association when it organized. In Toronto he was made first vice-president, and at Chicago this year he was elected its president.

All this is pure history. But what is Mr. Eames' great ambition today? To reach every crushed stone producer in these United States: to convince him of the exceeding value of joining the National; to show him how he can be directly benefited by this membership; what the National has already accomplished for the industry, both nationally and individually. It is perhaps "carrying coals to Newcastle" to tell ROCK PRODUCTS readers what this big, pulsating body and its leaders are doing—it can all be summed up in the one word, Service!

W. Scott Eames, President National Crushed Stone Association

Since his election, it has been his heart's desire to make the membership drive a huge success. And so far he has been very successful. But he is not yet satisfied—he is a veritable Oliver Twist crying for "more!"—and would have his plea reach every producer in the industry. He wants to see the National Association built up and recognized as one of the leading industries in the country.

This is truly a great ambition. We quoted the Association's Bulletin in our May 6 issue as saying: "When we think of all the time and money devoted to this association's work by some men who say nothing about it, we feel that there is still a very great deal of sincerity and fineness left to us in this old world."

President Eames comes easily under this category, but with this reservation: In season and out of season he is going to say much about his chosen purpose to build up a big membership. And we are sure that every member is behind his president in this great undertaking, and will do his share.

They Said It

THE *Traffic World* says it is glad to learn through the chairman of the Joint Commission of Agricultural Inquiry that definite plans are on foot for the establishment of a transportation institute. "The men chosen," says this journal, "should be chosen for their ability and experience and not because someone in authority desires to provide good jobs for them."

WHO is the largest stone producer in these United States? Giovanni Pottbelli, of Quarryville. He weighs 365 pounds!

THOMAS EDISON has told the Agricultural Committee that if Hen Ford's bid for Muscle Shoals is accepted, it means independence from Germany's potash supply. And whisper; Tom also says that Hen has $27,000,000 in banks subject to check.

ONE OF OUR EDITORS is on the road working from 6 a. m. to 9 p. m.—after which he is vacationing the rest of the 24 hours. He writes us: "Here in South Vernon (Mass.) wire me East Northfield; phone me Northfield 133-2; my garage is across the street, in Vernon, Vt. Is it any wonder I cannot find the keyhole here after dark?"

"DOLOMITE" BURNS says that while Camille Flammarion has discovered that "only vulgar souls appear to hover in our lower atmospheric regions, and thus are able to communicate with earthly spirits," he, Dolomite, has had no communication with spirits since his favorite bootlegger was pinched.

Saith the Prince of Pessimists:

OUR friend W. E. Carson, while busily guiding the destinies of the Riverton Lime Co., Riverton, Va., and as an active commissioner of the Hampton Roads Port Commission, can always find time to be intensely human. He sends us the following, laid on his desk by a Prince of Pessimists:

LIME PLANT OPERATORS!

WHEN you have finally gotten that troublesome stripping done—
WHEN the quarry is cleaned up and the stone is coming along in good shape—
WHEN the kilns are in good order and begging for more stone, and the fuel ratio mounting up to somewhere near where it should be—
WHEN the men understand that a good day's work is what you are paying them for—
WHEN the hydrator has decided to turn out a product that you can be proud of, and the railroads are offering you cars to an embarrassing extent—
WHEN all these things have come to pass and you begin to congratulate yourself as the operator of an economical plant—
THEN desire faileth, for man goeth to his long home—and the mourners goeth about the streets.

And when you, gentle reader, meet up with similar peppy stuff—mail it to us, care of Liman Sandrock, and we'll gladly publish it. We are delighted with the kind words received on this "little light spot" in our otherwise serious magazine, and humbly grateful, but— It's up to you to help us! Will you?

Editorial Comment

The Labor Shortage

All the way across Ohio and New York states operators are calling for help. Quarries and pits and plants are operating at capacity or near there, and while up to six weeks ago men were plentiful, it is now difficult to replace those who leave. Where the working force is steady there is little difficulty; the present situation relieves the superintendent of the task of turning away 30 or 40 men every morning. But where the force includes a percentage of shifters, the situation is more serious. In such places it is time—has always been time, in fact—to devise means of making the work more attractive in order to hold a full force of men.

With business as good as it is now in most of the rock producing industries, it would be bad management indeed to lose profitable business because a labor shortage prevents getting the needed output. How to prevent the shortage or to lessen the seriousness of its effect will vary with the conditions surrounding the plant.

That the situation reported by quarry and plant managers is becoming general is emphasized in a report of the National Industrial Conference Board. Common labor, as well as skilled and semi-skilled, is included in the reported shortages. Wage increases are the only methods reported for overcoming local shortages, but such methods can be only temporary and they result in a useless and harmful bidding up of wages which give no permanent gain to either employer or employe.

A good man to work for, agreeable working conditions, surroundings which attract the married men—these are more permanent and more effective in building a working force than rapid and unsound wage increases.

New Ideas—Better Business

Business is booming, say the gypsum men. Lime and cement and stone and gravel men are saying the same thing, but not with quite the same unanimity that has been strikingly apparent among the producers of gypsum. It goes without saying that good business for these industries means they supply a product which fills a need and fills it well.

There's another fact about the gypsum industry which has been brought out in recent developments. In two cases where new gypsum plants are planned, not only has competent designing ability been employed, but the officers of the companies have spent their valuable time away from other duties to make extended inspection trips to other gypsum plants in the search for ideas to make their own plants more effective.

Now there may be little connection between good business for gypsum producers and plant inspection trips by members of the same industry, but it is barely possible that the sharing of ideas in this manner helps all gypsum men to get out a little better product at a little lower price, or to market that product a little more effectively, so that in competition with other products for similar uses gypsum has a little greater advantage than it otherwise would. Co-operation usually works out that way. The same thing has been found true in the other industries mentioned.

The wise individual is he who takes advantage of this opportunity to visit other plants and absorb new ideas. The official or manager or superintendent who remains all absorbed in his own plant soon becomes afflicted with dry rot, and no matter how good his plant in the beginning or how clever a manager he is, his plant loses some of its possibilities when he fails to go out frequently in search of new ideas.

A New York state quarry owner heard of a new grizzly being tried out a hundred miles away. He went personally to see it working, to see if it could be used at his own plant. His plant, you may be sure, is an effective and a successful one. Routine does not demand your constant attendance at your own plant; the good of your business demands rather that you get out and see how other people are doing things. Ideas are what build businesses.

Laws May Lie

Legislators always mean well. Whatever measures may be passed, they are intended for the benefit of the majority of persons affected. But sometimes a law is passed on some pretext or other which does good to none and works injustice to many. Such a one specifies in some states the weights per cubic yard of certain concrete aggregates. Such a specification is misleading, and its fallacy is easily apparent when one considers that this weight depends on four variable conditions—specific gravity, shape of particle, grading, and moisture. The grading and shape of particles together, without the influence of specific gravity or moisture, may cause a cubic yard of aggregate to vary in weight from 2500 pounds to 3400 pounds. When different weights are assigned empirically to different classes of aggregates, the law can be right only when the conditions affecting the weight of the aggregate happen to make a cubic yard of the legal weight, and the difference in weights assigned may cause all kinds of incorrect assumptions against one or all of the materials designated. If the law says a ton of one is equivalent to a ton and a quarter of another, the first material benefits in some cases, while the purchaser may lose through extra cement needed to fill the voids. It is to the interest of aggregate producers and their customers alike to prevent such misleading laws from enactment.

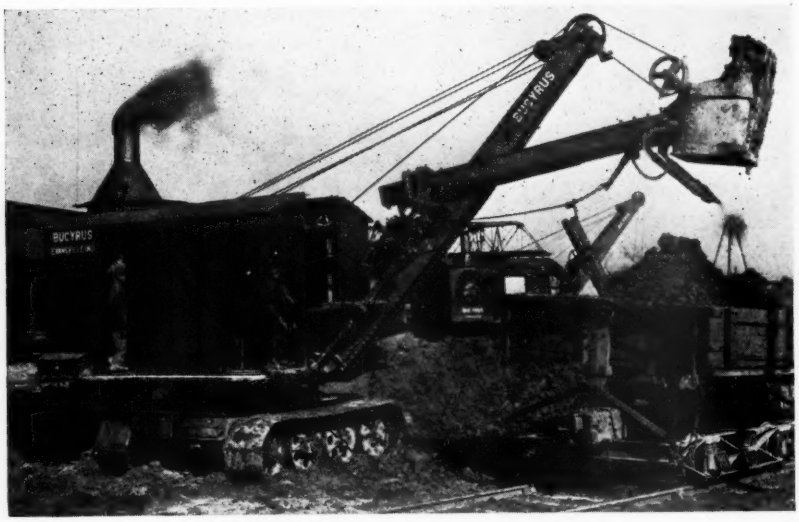
New Machinery and Equipment

A New ¾-Yd. Revolving Shovel

REPLACING its 14-B revolving shovel, the Bucyrus Co., South Milwaukee, Wis., has announced a new 20-ton, ¾-yd. revolving shovel known as the 20-B, making for it the following claims:

From boom point to ashpan, this shovel is of new design. In general the design follows along the lines of the Bucyrus 30-B shovel. It is a "universal" machine, being adaptable to dragline, high lift, clamshell, crane and other combinations.

The new features include a two-part hoist whereby the dragline excavator can be made as good a dragline as the shovel is a shovel; the wear on rope is reduced, a shorter rope is required, and faster digging speed is made possible without sacrifice of power. It also has the outside type of dipper sticks and the box girder type of boom and a strong construction for withstanding the twisting and wrenching strains so severe in shovel work. The A-frame is directly connected to a steel center casting, as is the back leg, affording a solid support. The dipper has all four corners rounded, increasing its ability to free itself from sticky material. The dipper latch is double-hinged, thus preventing bending of the latch or breakage if the dipper hits a wagon or truck. A device is provided for keeping the dump rope always taut for ease in dumping.



A Bucyrus ¾-yd. revolving shovel at work

This shovel is equipped with an improved and simplified three-lever control; one lever controls the independent operation of the throttle and the ram. A release throttle is provided whereby the dipper may be lowered without applying the brake. There are two speeds. A change from one to the other may be made with one lever, similar to an automobile gear shift. Propelling may be accomplished without closing a gate valve to the hoisting engines.

A further feature is a device whereby the stack may be lowered by power, thus eliminating the possibility of damaging the stack and the rear of the house.

Centering the revolving frame on the base is accomplished by the revolving frame casting and the base center casting fitting into each other so that they take all the side thrusts. This relieves the vertical propelling shaft, which is depended upon ordinarily to center the machine of all strains.

The shovel is interchangeable from caterpillars to trucks or traction wheels. There are only two rollers in each caterpillar of large diameter with bearings high out of the mud and water. The driving is through direct gearing to the tumblers; no chains are used. The elimination of the side frames increases the accessibility and ease of repair and adjustment. The rollers may be removed without disconnecting the caterpillar chain. The links are of one piece, made of a specially selected and specially treated steel. The pin connections are on the outside, thus assuring straight travel and preventing damage should a link strike an obstruction. There are 23 links in each caterpillar, forming a smooth platform with no gaps between links to pick up rocks and act as small jaw crushers.

This shovel is equipped with the ideal type of steer. For adoption in the pit, where a pit man is always available, a simple and effective hand steer is provided. The clutches are on the outside, out of danger of geting clogged with mud. There are no links and rods to get out of order. Steering is accomplished by pointing the boom in the direction of travel. The caterpillars track after this wheel. The machine travels steadily and straight.

The 20-B is a dragline excavator and makes possible a straight lead for the drag rope. The fair lead affords a vertical as well as a horizontal lead to the rope and reduces friction and rope wear to a minimum. The standard equipment is a ¾-yd. bucket and a 35-ft. boom. It may be supplied with various lengths of booms and handles to adapt it to high lifts.

New Direct-Reading Resistance Thermometer

A DIRECT-READING thermometer has been placed on the market by the Brown Instrument Co., Philadelphia, for use where temperatures must be known with extreme accuracy and maintained constantly within close limits. This is an instrument in which the whole temperature scale may cover 25 deg. only.

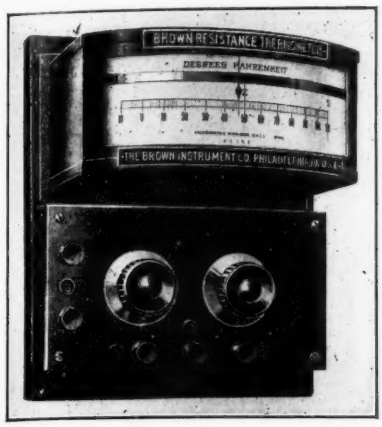
For example, in a given process it may be necessary to maintain 820 deg. with 750 and 900 deg. respectively, the maximum range of variation. Using this thermometer, the scale can be graduated from 750 to 900 deg., each division being equivalent to 1 deg., and thus permitting of close accuracy in the readings.

Its fundamental principle is the property of metals, except special resistance alloys, of change in resistance with change in temperature, this change being accurately measured and a scale calibrated to read in degrees of temperature.

The bulb which changes in resistance is usually of nickel for temperatures up to 300 deg. Fahr. and of platinum for temperatures up to 1800 deg. The bulb can be very small, a nickel-wire bulb being provided with the active part 1 in. long and 3/16 in. in diameter. This for moderate temperatures can be provided with a protecting tube having an outside diameter of only ¼ in. Three wires lead from the bulb to the instrument, the three-wire system being intended to eliminate any effect on the indications of the instrument due to changes in tempera-

ture along the wiring. The length of the wiring is immaterial.

To check the instrument for zero reading the left-hand knob is turned to Z, and



Direct-reading resistance thermometer in which the whole side may cover a range of 25 deg. only

then to S to check the instrument with a standard resistance at the top graduation on the scale. In the third position the knob is operated directly off the temperature bulb. The rheostat, controlled by the right-hand knob, is used for adjusting the voltage. This check is recommended daily but need be only every few days.

By using a switch the instrument may be connected to several bulbs in various places. Used in dry kilns, it can be used to measure both temperature and humidity, one bulb being subjected to the air temperature only, a second bulb being covered by a wick connected to a tank of water. This construction is designed to permit the measurement of both temperature and humidity at great distances.

New Direct-Drive Secondary Crusher for the Industry

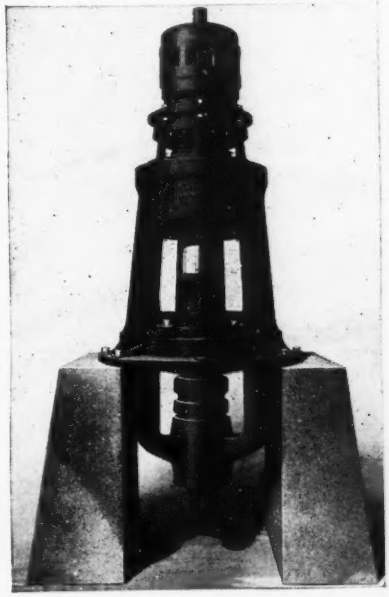
ANNOUNCEMENT is made by the Morgan Engineering Co., Alliance, Ohio, that it is manufacturing the Weston direct-drive gyratory crusher for rejection or secondary work, and developed by an engineer who operated a crushed granite plant for a number of years.

The crusher is a rejection machine for following primary crushers and reducing oversize hard rock or ore. All parts of the machine subject to wear are, says the company, inexpensive and replacable with a minimum of work and time. The motor is mounted vertically and connected direct to eccentric by flexible coupling. Where electric current is not available, belt or rope drive may be used from line shaft or other sources or power.

The shaft is a chrome vanadium steel forging; the frames, core, eccentric, shaft supporting bushing, etc., are annealed steel castings; eccentric and universal eccentric bushings of bronze.

Dust is prevented from entering into the eccentric and pivot bearings. The eccentric is oil-floated and the pivot bearing will give long life without rebushing, it is claimed. The eccentric pumps its own oil without accessory pumps, gears or pipes at the rate of several gallons a minute and also furnishes the flow of oil for pivot bearing which is regulated by needle valve and sight feed.

On account of the location of the eccentric, direction of throw and diminishing throw from top of crushing bowl to bottom and speed of machine, the concaves and mantles last longer, the rejections



The new Weston direct-drive rejection gyratory crusher

square up, thus eliminating flat slabs, and comparatively small amount of screenings are made. By removing six belts, all parts are immediately accessible to overhead crane or other lifting tackle.

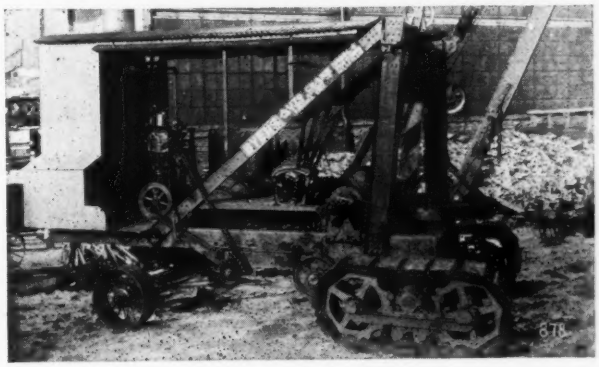
Accurate tests of a No. 36-A, crushing the toughest granite, averaging 100 tons per hour and running well over 200 on peaks, taking the rejections from a No. 27 gyratory, are said to show the highest power consumption to be 67 hp., and the lowest on load 35. In handling this tonnage the machine was running idle 50 per cent of the time. The power consumed by motor, disconnnected, is 3.7 hp.; consumed by crusher idle, 6.6 hp.; total average power consumed under load, 50.2 hp. These results were obtained under a load based on 56 readings during four hours' operation with the primary wide open to capacity.

This machine is smaller than a standard No. 5, but it is said to take 7½ in. maximum stone and rejects 2½ in. maximum stone 200 tons per hour.

New Auto-Crane for Material Handling

A NEW auto-crane shown in the illustration is announced by the manufacturers, the Byers Machine Co., Ravenna, Ohio—the Model 4. The new features claimed for this material-handling crane are the banked levers, raised platform for the operator, heavy reinforced A-frame and mast; a 42-in. boiler, semi-inclosed cab, gear-driven swinger; steel outrigger nuts and swiveling feet; steel shoes for the caterpillars; steel coal and 120-gal. water tank; steel boom; three-point suspension truck, and the 16-in. interchangeable sheaves.

This crane is of the following dimensions: Length of the car body, 17 ft. 2 in.; width, 6 ft. 6 in.; height from ground to top of A-frame sheave, 13 ft. 5 in:; width of outside riggers, 19 ft. Its capacity is: 10,000 lb. at 10 ft. on double line, 8000 lb. at 15 ft., 6500 lb. at 20 ft. and 5500-lb. bucket and load at 20 ft. on single line. The boom length is 30 ft.



Model 4 Byers auto-crane

for bucket work, and in special cases up to 40 ft. for derrick work. The weight, complete without bucket, is 14 tons. Its propelling speed is, forward or reverse, 100 ft. per minute on hard level surface.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.10	.....
Buffalo, N. Y.	1.30 per net ton all sizes					
Burlington, Vt.	1.00	.....	2.50	2.00	2.00	.....
Chaumont, N. Y.	1.00	.....	1.50	1.25	1.25	1.25
Coldwater, N. Y.	1.50 per net ton all sizes; fluxing stone 1.80 per ton					
Eastern Penna.	1.10	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.	1.00	1.15	1.15	1.15	1.15	1.15
Prospect, N. Y.	1.00	1.25	1.25	1.25	1.25	.....
Walford, Pa.	.....	1.30	.....	.....	1.30	.....
Western New York	1.00	1.20	1.20	1.20	1.20	1.20
CENTRAL						
Alden, Ia.	.80@1.00	.80@1.00	1.50	1.45	.....	.....
Alton, Ill.	1.75	.....	1.40	1.35	1.35	.....
Buffalo, Iowa	.90	.....	1.20	1.00	1.05	1.05
Chicago, Ill.	1.20	1.60	1.20	1.20	1.20	1.20
Dundas, Ont.	1.00	1.35	1.35	1.25	1.10	1.10
Faribault, Minn.	.....	.....	.....	.....	1.75	.....
Greencastle, Ind.	1.25	1.10	1.10	.90	.90	.90
Illinois, Southern	1.75	1.60	1.50	1.50	1.40	.....
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.50
Kokomo, Ind.	1.10	1.25	1.25	1.10	1.10	1.10
Krause or Columbia, Ill.	1.40	1.20	1.35	1.20	1.20	1.20
Lannon, Wis.	.85	.....	.95	.....	.85	.85
Mitchell, Ind.	.90	.....	.....	.....	.....	.....
Montreal, Canada	.85	1.20	1.10	1.05	1.00	.....
Montrose, Ia.	1.25	1.55	1.65	1.55	1.50	.....
River Rouge, Mich.	1.00	1.10	1.10	1.10	1.10	1.00
Sheboygan, Wis.	1.05	1.10	1.05	1.05	1.00	.....
Southern Illinois	1.40	1.30	1.40	1.40	1.40	.....
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.25	1.35	.....	.....
Stone City, Iowa	.....	.....	1.40	1.30	1.25	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	2.25	2.25	2.00	2.00
	Prices include 90c freight					
Valmeyer, Ill.	1.60	1.30	1.30	1.30	1.30	1.30
Waukesha, Wis.	all sizes .80 per ton					
SOUTHERN:						
Alderson, W. Va.	1.10	1.35	1.65	1.35	1.35	.....
Bromide, Okla.	1.50	.....	.....	1.50	1.50	.....
Cartersville, Ga.	.....	2.00	1.40	1.25	1.25	.....
Chickamauga, Tenn.	.90	1.00	1.00	1.00	.90	.....
Dallas, Texas	1.00	1.00	1.00	1.00	1.00	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	.....	.....
Gainesville, Ga.	1.00	1.25	1.25	1.25	1.25	1.25
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Ladds, Ga.	2.00	2.00	2.00	1.50	1.50	1.50
Morris Spur (near Dallas) Tex.	1.00	1.25	1.25	1.25	1.25	1.00
Portland, Ga.	.60@1.00		(All other sizes 1.00@1.25)			
Shephard, Tenn.	1.00	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.....
WESTERN:						
Atchison, Kans.	.90	1.80	1.80	1.80	1.80	1.80
Blue Springs and Wymore, Neb.	.20	1.65	1.65	1.55	1.45	1.40
Cape Girardeau, Mo.	1.50	.....	1.50	1.50	1.25	.....
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.40

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2 20	2.00	1.80	1.50	.....
Branford, Conn.	.60	1.50	1.25	1.15	1.00	.....
Bound Brook, N. J.	1.80	2.30	1.90	1.50	1.40	.....
Dresser Jct., Wis.	1.25	2.25	2.25	2.00	1.50	1.50
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.40@1.50	1.30@1.40	1.30@1.40
E. Summit, N. J.	2.10	2.30	2.00	1.70	1.40	.....
Eastern Mass.	.60	1.85	1.60	1.50	1.50	1.50
Eastern New York	.75	1.60	1.60	1.40	1.40	1.40
Eastern Penna.	1.25	1.65	1.50	1.40	1.30	1.30
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.50	1.25	1.15	1.00	.....
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	1.75
Richmond, Calif.	.50*	.....	1.75*	1.50*	1.50*	.....
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Springfield, N. J.	1.75	2.10	1.80	1.75	1.60	1.60
Westfield, Mass.	.60	1.35	1.25	1.10	1.00	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Alexandria Bay, N. Y.	1.60	.....	1.30	1.50	1.20	.....
Columbia, S. C.—Granite	.....	.....	1.75@2.00	1.75	1.60@1.75	.....
Dundas, Ont.—Flint	1.00	1.50	1.50	1.50	1.25	1.20
Eastern Penna.—Sandstone	.85	1.60	1.50	1.35	1.35	1.35
Eastern Penna.—Quartzite	.90	1.35	1.20	1.20	1.30	1.30
Ft. Springs, W. Va.—Granite	1.00	1.25	1.40	1.25	1.20	.....
Lithonia, Ga.—Granite	1.00	1.50	1.50	1.15	.....	1.15
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30	.....	1.20	.....
Los Angeles, Calif.—Granite	.....	1.25@1.50	1.15@1.40	1.15@1.40	.....	.....
Macon, Ga.—Granite	.50	.....	2.50	2.25	2.00	1.25@1.90
Middlebrook, Mo.—Granite	3.00@3.50	4.00@5.00	.....	2.00	.....	1.25
Sioux Falls, S. D.—Granite	.75	1.85	1.75	1.70	1.70	.....

*Cubic yard. †Agrl. lime. ||R. R. ballast. §Flux. ‡Rip-rap, a 3-inch and less.

Agricultural Limestone

EASTERN:

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.00; bulk 2.50

Grove City, Pa. — Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$—100% thru 20 mesh, 60% thru 100 mesh, 40% thru 200 mesh; in 80 lb. paper sacks, 4.50; bulk 3.00

Hillsville, Pa. — Analysis, 96.25% $CaCO_3$—Raw ground; sacks, 4.50; bulk 3.00

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; sacks, 4.00; bulk 2.50

New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

Osborne, Pa.—45% thru 200 mesh, 60% 100 mesh, 100% thru 20 mesh; 4.50 sacks; bulk 3.00

Texas, Md.—Analysis, 58.02% $CaCO_3$, 37.3% $MgCO_3$—50% thru 50 mesh; bags, 4.25; bulk 2.50

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.25—cloth, 4.75; bulk.... 3.00

Williamsport, Pa. — Analysis, 90% $CaCO_3$, 2% $MgCO_3$—50% thru 50 mesh; paper, 4.75; bulk..... 3.75

CENTRAL:

Alton, Ill.—Analysis, 97% $CaCO_3$, 0.1% $MgCO_3$—90% thru 100 mesh..... 6.00

Bedford, Ind. — Analysis, 98.5% $CaCO_3$, .5% $MgCO_3$—90% thru 10 mesh 1.50

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Bellevue, Ohio — Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh..... 1.25

Bettendorf, Ia., and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh..... 1.50

Buffalo, Ia.—90% thru 4 mesh..... 1.00

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.3% $MgCO_3$ (90% thru 50 mesh, 2.00), 50% thru 4 mesh..... 1.50

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh.... 1.00

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh..... 2.00

Kansas City, Mo.—50% thru 100 mesh 1.50

Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh..... 1.40

Lannon, Wis.—Analysis, 54% $CaCO_3$, 41% $MgCO_3$—90% thru 50 mesh..... 2.00

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$—50% thru 100 mesh; bags, 4.50; bulk..... 3.00
90% thru 4 mesh..... 1.25

Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$—40.8% thru 100 mesh, 61.2% thru 50 mesh..... 1.40@1.50

Mitchell, Ind. — Analysis, 97.65% $CaCO_3$, 1.76% $MgCO_3$—pulverized limestone 1.50
Montrose, Ia.—90% thru 100 mesh..... 1.25

Narlo, Ohio—Analysis 56% $CaCO_3$, 43% $MgCO_3$, limestone screenings, 37% thru 100 mesh; 55% thru 50 mesh; 100% thru 4 mesh..... 1.50@2.00

Ohio (different points), 20% thru 100 mesh; bulk ..... 1.25@1.50

Piqua, O.—100% thru 10; 90% thru 50; 70% thru 100..... 3.25@5.00
99% thru 10; 55% thru 50; 40% thru 100 ..... 1.75@2.00

River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@1.40

Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ½-in. mesh..... 1.30

Stone City, Ia.—Analysis, 98% $CaCO_3$, 50% thru 30 mesh..... .75

(Continued on next page)

Agricultural Limestone

(Continued from preceding page.)

Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh	1.50
Waukesha, Wis.—No. 1 kiln dried	2.00
No. 2 Natural	1.75
Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$—90% thru 100 mesh	5.00
90% thru 50 mesh	1.35
Yellow Springs, Ohio—Aanlysis 96.08% $CaCO_3$, 63% $MgCO_3$, 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk	4.25
SOUTHERN:	
Alderson, W. Va.—90% thru 50 mesh	1.50
Barber, Va.—Analysis, 92 to 98% $CaCO_3$—Bags, 6.50; bulk	4.50
Blowers, Fla.—Analysis, 98% combined carbonates—75% thru 200 mesh	4.75
Cape Girardeau, Mo. — Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$ — 50% thru 100 mesh	2.00
90% thru 4 mesh	1.50
Cartersville, Ga.—Analysis, 55% $CaCO_3$, 42% $MgCO_3$—all passing 10 mesh	2.00
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$—90% thru 100 mesh, 4.00; 50% thru 100 mesh, 3.00; 90% thru 50 mesh, 3.00; 50% thru 50 mesh, 2.75; 90% thru 4 mesh, 2.75; 50% thru 4 mesh	2.75
Ft. Springs, W. Va. — 50% thru 100 mesh	3.00
Hot Springs, N. C.—90% thru 100 mesh, sacks, 4.25; bulk	3.00
Knoxville, Tenn.—Pulverized	2.50
90% thru 100 mesh	2.70
100% thru 10 mesh	2.25
Ladds, Ga.—90% thru 50 mesh	2.00
Linnville Falls, N. C.—Analysis,, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh; sacks, 4.50; bulk	3.00
Mountville, Va. — Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—X thru 20 mesh; sacks	5.00
WESTERN:	
Colton, Calif.—Analysis, 95% $CaCO_3$, 2-4% $MgCO_3$—all thru 14 mesh—bulk	4.00
Garnett, Okla.—Analysis, 86% $CaCO_3$, 50% thru 4 mesh	.50
Kansas City, Mo., Corrigan Sid'g—50% thru 100 mesh; bulk	1.80
Terminous, Calif. — Analysis, 97.3% $CaCO_3$, .04% $MgCO_3$—65% thru 200 mesh, 90% thru 100 mesh, 95% thru 80 mesh, 100% thru 50 mesh; sacks, 5.00; bulk	4.50
Tulsa, Okla.—90% thru 4 mesh	.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:	
Baltimore, Md.	2.25
Berkley Springs, W. Va.	1.75@2.00
Cedarville and South Vineland, N. J.—Damp, 1.75; dry	2.25
Cheshire, Mass.	5.00@8.00
Columbus, Ohio—Glass sand	1.25
Dunbar, Pa.—Damp	2.00
Falls Creek, Pa.	2.50
Hancock, Md.—Damp	1.25@1.75
Klondike and Pacific, Mo.	1.75@2.50
Mapleton, Pa.	2.25@2.50
Massillon, Ohio	3.00
Mineral Ridge, O.	2.50
Green	2.25
Montoursville, Pa.	1.75
Oregon, Ill.—Glass sand	.75
Ottawa, Ill.	.75
Pittsburgh, Pa.—Dry, 4.00; damp	3.00
Rockwood, Mich.	2.50@2.75
Round Top, Md.—Dry	1.25
San Francisco, Cal.	3.00@3.50
St. Mary's, Pa.	2.25
Thayers, Pa.	2.00@2.50
Utica, Ill.	1.00@1.25
Zanesville, Ohio	2.00@2.50
FOUNDRY SAND:	
Albany, N. Y.—Sand blast	4.00
Molding fine and brass molding	2.00
Molding coarse	1.75
Allentown, Pa.—Core and molding fine	1.50@1.75
Arenzville, Ill.—Molding fine	1.20@1.60
Beach City, O.—Core, washed and screened	2.00@2.50
Furnace lining	2.50@3.00
Molding fine and coarse	2.25@2.50
Cheshire, Mass.—Furnace lining, molding, fine and coarse	5.00
Sand blast	5.00@8.00
Stone sawing	6.00
Cleveland, O.—Molding coarse	1.50@2.00
Brass molding	1.50@2.00
Molding fine	1.50@2.25
Core	1.25@1.50
Columbus, O.—Core	.30@1.75
Sand blast	3.50@5.00
Furnace Lining	1.50
Molding fine	2.00
Molding coarse	1.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.75	.75	.75	.60	.60	.60
Ambridge and So. Heights, Pa.		1.15	1.15	1.15	.70	.70
Buffalo, N. Y.	1.10	.95	.85	.85	.85	.85
Erie, Pa.	1.00		1.00		1.25	
Farmingdale, N. J.	.48	.48	1.00	1.00	1.20	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75	1.35	1.35	1.25
Ludlow, Mass.	.75*	.75*	1.70		1.50*	1.50*
Machias, N. Y.	.95	.95	.85	.85	.85	.85
Philadelphia, Pa.	.75	.75		1.40	1.25	
Pittsburgh, Pa.	1.15	1.15	1.15	1.15	.70	.70
Portland, Maine		.50	1.75		1.35	1.35
Texas, Md.		1.00		Pure white sand, 1.50		
Washington, D. C.	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.40	.40				.90
Attica and Covington, Ind.	.90	.90	.90	1.00	1.00	1.00
Barton, Wis.		.60	.70	.70	.70	.70
Beloit, Wis.		.50			.50	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75	.75@1.00	.75	.75@1.00	.75@1.00	.75
Des Moines, Ia.	.50	.40	1.50	1.50	1.50	1.50
Detroit, Mich.	.65	.65	.95	.95	.95	.95
Farlestead (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			
Eau Claire, Wis.	.40	.40	1.25	1.00		.90
Elkhart Lake, Wis.	.60	.54	.70	.68	.68	.60
Ft. Dodge, Ia.		1.22		2.17		
Grand Rapids, Mich.		.50		.80		.70
Greenville, Mechanicsburg, O.	.65	.65	.65	.65	.65	.65
Hamilton, Ohio		.90			.90	
Hawarden, Ia.		.50			1.60	
Hersey, Mich.		.40			.80	
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Le Mars and Doon, Ia.				1.90		
Libertyville, Ill.		.50		.70		
Mankato, Minn.—Pit Run	.50	.40	.40			1.25
Mason City, Ia.	.65	.55	1.80	1.70	1.60	1.55
Milwaukee, Wis.	1.06	1.06	1.26	1.26	1.26	
Minneapolis, Minn.	.35	.35	1.25	1.25	1.25	1.25
Moline, Ill.	.60	.60	1.20	1.20	1.20	1.20
Riton, Wis.		.40			.60	
St. Louis, Mo., f. o. b. cars	1.10	1.30	1.50	1.30		1.25
St. Louis, Mo., delivered on job	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.65	.65	.65	.75	.75	.75
Terre Haute, Ind.	.60	.60	.60	.75	.60	.60
Waukesha, Wis.	.60		All other sizes, .70 per ton			
Winona, Minn.	.50	.40	1.00	1.25	1.00	1.00
Yorkville and Moronts, Ill.	.80	.60@ .80	.60@ .80	.60@ .80	.60@ .70	.60
SOUTHERN:						
Alexandria, La.		.70			1.20@1.35	
Birmingham, Ala.	1.48		all gravel—1.88			
Charleston, W. Va.		1.40				1.50
Estill Springs, Tenn.	1.35	1.15		1.00	.85	.65
Ft. Worth, Tex.		2.00		2.00		2.00
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	1.00	1.00	1.75	1.50	1.50	1.50
Lake Weir, Fla.		.60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.12	1.12				1.95
N. Martinsville, W. Va.		1.00		1.20		.80
New Orleans, La.		.50			1.00	
Pine Bluff, Ark.	1.20	.90	Washed gravel, all sizes, 2.25			
Roseland, La.		.25	.85	.85		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Jedburg, Mo.	.70	1.20	.95	.75	.75	.70
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton, Missouri River, .85)					
Los Angeles, Calif.		.75	1.25	1.25	1.15	1.15
Niles, Calif.	1.00	1.00	1.40	1.00	1.00	1.00
Pueblo, Colo.	1.10*	.90*		1.25*	1.50*	1.50*
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.25*	1.25*	2.00*	1.25*		1.50*
Yutan, Neb.	.40		Bank run .40			

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.75	.75	.75	.75	.75	.75
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, 1.00 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dudley, Ky. (Crushed Sand)	1.00	1.00		.95		
East Hartford, Conn.			.65 per cu. yd.			
Estill Springs, Tenn.						.85
Fishers, N. Y.	.50@ .75			.50		
Hamilton, Ohio			.40 per cu. yd. in pit			
Hartford, Conn.		1.00*				
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Tex.		.95				.60
Janesville, Wis.		.65			.65@ .75	
Oxford, Mich.				.65	.65	
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.		.75				
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			60% gravel, 40% sand, 1.40			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Tex.		.80		1.50		1.30
Winona, Minn.			Clean pit run .50@.60			
York, Pa.		.95@1.20		(crushed rock sand)		

*Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.50	1.25	1.15	1.10	1.10
Eastern Pennsylvania and Northern New Jersey	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.00	.80	1.25	.90	.90	.90	.90
Erie, Pa.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.	All sizes, $1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65. F. O. B. Detroit						
Ironton, O.	2.05	Other grades 1.45					
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.92	1.67	1.77	1.77	1.77	1.67	1.67
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	(Any delivery in city except team track deliveries) 1.30	1.50	1.30	1.30	1.30	1.30
Steubenville, Lowellville and Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton & Low Moor, Roanoke, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Burnt Lime Blk.	Ground Burnt Lime Bags	Lump Lime Blk.	Lump Lime Bbl.
EASTERN:								
Adams, Mass.			7.00					3.50
Bellefonte, Pa.			8.00	9.00	8.00		7.00	
Berkley, R. I.			12.00					2.30
Buffalo, N. Y.	10.50	9.00	8.50@11.00	11.00	7.25	9.25	8.00	1.50
Chaumont, N. Y.					2.50	4.00		
Lime Ridge, Pa.							5.00	
Paxtang and LeMoyne, Pa.					5.00		4.75@5.00	
Union Bridge, Md.			13.00		5.50			
West Rutland, Vt.	13.50@14.00	11.00@11.50	11.00@11.50	13.50	10.00		11.00	3.50
West Stockbridge, Mass.			15.00					
Williams and Blue Bell, Pa.			11.25					
Williamsport, Pa.			10.00			10.00	6.00	
York, Pa. (dealers' prices)		10.50	10.50	10.50	10.50		7.50	1.65*
CENTRAL:								
Delaware, Ohio	10.50	9.00	8.00	10.00			8.00	1.50
Geneo, Ohio	10.50§							
Gibsonburg, Ohio	10.50	9.00	8.50	11.00	7.25	9.25	8.00	1.50
Huntington, Ind.	10.50	9.00	8.50				8.00	1.70*
Knowles and Valders, Wis.			12.50		5.00	9.00		
Luckey, Ohio	10.50	9.00	8.00				8.00	
Marblehead, Ohio	10.50	9.00	8.50	11.00	7.25	9.25	8.00	1.50*
Mitchell, Ind.		11.00	11.00	11.00	9.50		8.50	1.45
Sheboygan, Wis.					5.50	8.50		
White Rock, Ohio	10.50	9.00	8.50	11.00	7.25	9.25	8.00	1.50
Woodville, O. (dlrs.' price)	10.50a	9.00a	8.00a	10.00a	7.25		8.00	1.50
SOUTHERN:								
El Paso, Tex.							12.50	
Erin, Tenn.							6.00	1.00
Karo, Va.							7.00	1.30
Knoxville, Tenn.	22.00	9.50@11.00	9.50	9.50	8.00	9.50	7.50	1.30
Ocala and Zuber, Fla.	12.00				11.00	10.00		1.50
Sherwood, Tenn	11.00	9.50			7.50		7.50	
Staunton, Va.					8.00		9.50b	1.60
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. Mex.							12.50	
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.15*
Tehachapi, Calif.							13.00	2.00

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; §Paper sacks. (a) 50-lb. paper bags; terms, 30 days net; 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice. (b) Burlap bags. (c) 200-lb. bbl.

Miscellaneous Sands

(Continued from preceding page)

Stone sawing	1.25
Traction	.75
Brass molding	2.00
Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass Molding	2.15
Dresden, O.—Core and traction	1.00
Molding, fine and coarse	1.25
Brass molding	1.50
Dunbar, Pa.—Traction, damp	2.00
Dundee, O.—Glass, core, sand blast, traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Eau Claire, Wis.—Core	1.25
Sand blast	2.50@3.75
Traction sand	.40
Falls Creek, Pa.—Molding, fine and coarse	1.75
Sand blast	3.00
Traction	1.75
Franklin, Pa.—Core	1.00@1.75
Furnace lining	2.25
Molding fine	2.00
Molding coarse	1.75
Brass molding	2.00
Greenville, Ill.—Molding coarse	1.00@1.40
Joliet, Ill.—Milled, dried and screened No. 2 coarse molding sand and open hearth loam and looting clay	.60@ .80
Kansas City, Mo.—Missouri River core	.80
Kasota, Minn.—Molding coarse and fine, stone sawing (pit run)	1.75
Klondike, Pacific and Gray Summit, Mo.—Molding fine and core	1.75@2.00
Mapleton, Pa.—Glass sand, core, furnace lining, molding fine and coarse; dry, 2.50; damp	2.00
Massillon, O.—Traction, molding fine and coarse, furnace lining, core	2.50
Michigan City, Ind.—Core, traction	.30@ .40
Mineral Ridge, Ohio—Core	1.75@2.00
Furnace lining, molding fine and coarse, roofing, sand blast, stone sawing and traction, brass molding	1.75
Montoursville, Pa.—Core	1.25@1.50
Traction	1.00@1.25
Brass molding	.40
New Lexington, O.—Molding fine	2.00
Molding coarse	1.75
Oregon, Ill.—Core, furnace lining, molding fine and coarse, traction	.75
Brass molding	.75
Sand blast	3.00
Ottawa, Ill.—Core, furnace lining, steel molding	1.00
Roofing sand	.75@3.50
Sand blast	3.50
Ottawa, Minn.—All crude silica sand	.75@1.25
Pelzer, S. C.—Glass sand (carload lots only)	.70
Rockwood, Mich.—Core, damp	2.00
Roofing	2.75
Sand blast	3.75

Miscellaneous Sands

(Continued)

Round Top, Md.—Glass sand	1.75@2.00
Core, furnace lining	1.45
Traction	1.60
(All per 2000 lbs.)	
San Francisco, Cal. (Washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@3.50
Direct from pit.	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
Thayers, Pa.—Core	1.75
Furnace lining	1.25
Molding fine and coarse	1.25
Traction	1.75
Utica, Ill.—Core	.75@1.00
Furnace lining	.75
Molding fine and coarse	.60
Sand blast	2.50
Stone sawing	.65
Traction and brass molding	1.00@1.25
Utica, Pa.—Core	1.25@2.25
Molding fine and coarse, traction, brass molding	2.00
Warwick, O.—Core, furnace lining, molding fine and coarse (damp, 1.50) dry	2.00
Traction (dry)	2.00
Zanesville, Ohio—Brass molding and molding fine	1.35@1.75
Molding coarse	1.35@1.50

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude Talc	3.50
Ground talc (20-50 mesh), bags	10.00
Cubes	50.00
Blanks, per lb.	.07
Chatsworth, Ga.—Crude talc	8.00@10.00
Ground talc (150-200 mesh), bags	12.50
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Chester, Vt.—Ground talc (150-200 mesh)	7.00@ 9.00
Emeryville, N. Y.—150-200 mesh; bags	14.75
Glendale, Calif.—Ground talc (150-200-mesh	16.00@30.00
(Bags extra)	
Ground Talc (50-300 mesh)	13.50@15.50
200 mesh)	13.50@14.50
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	2.75@3.50
Ground talc (20-50 mesh)	5.75@ 6.00
(150-200 mesh) bags	8.75@12.00
Johnson, Vt.—Ground talc (20-50 mesh), bulk 7.50 (150-200 mesh)	8.00@15.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags extra)	
Los Angeles, Calif.—Ground talc (200 mesh) (includ. bags)	15.00@20.00
(150-200 mesh) bags	16.00@40.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	9.00@16.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	7.50
(Bags $1.00 extra)	
Ground talc (150-200 mesh), bulk	9.00@14.00
(Bags 1.00 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

Raw Rock

Per 2240-lb. Ton	
Centerville, Tenn—B.P.L. 72% to 75%	6.00@8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68%@72%	4.00@5.00
Tennessee—F. o. b. mines, long tons, unground Tenn. brown rock, 72% B. P. L.	7.00
Mt. Pleasant, Tenn.—Analysis, .70 B.P.L. (2000 lbs.)	6.50
Montpelier, Idaho—70% B.P.L.—Crude	4.75
Crushed 2-in. ring and dried	5.00
Paris, Idaho.—2,000 lb. mine run, B.P.L. 70%	4.00
Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. Ton	
Barton, Fla.—Analysis, 50% to 65% B.P.L.	3.50@6.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$7.80
24x14	9.30	8.40	8.10	7.80
22x12	10.80	8.70	8.40	9.10
22x11	10.80	8.70	8.40	9.10
20x12	10.80	8.70	8.40	9.10
20x10	11.70	9.00	8.70	8.40
18x10	11.70	9.00	8.70	8.40
18x 9	11.70	9.00	8.70	8.40
16x10	11.70	8.40	8.40	8.10
16x 9	11.70	8.40	8.40	8.10
16x 8	11.70	8.40	8.40	8.10
18x12	11.10	8.70	8.40	8.10
16x12	11.10	8.70	8.40	8.10
14x10	11.10	8.40	8.10	7.80
14x 8	11.10	8.40	8.10	7.80
14x7 to 12x6	9.60	8.40	8.10	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.20	$5.75
22x11	8.40	7.80	7.50	5.75
Other sizes	8.70	8.10	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.
Granulated slate per net ton f. o. b. quarries, Vermont and New York, 7.50

(Continued from preceding page)

Ground Rock

Centerville, Tenn.—B.P.L. 65%	6.00
B.P.L. 75% (brown rock)	12.00
Columbia, Tenn.—B.P.L. 68% to 72%	5.50
B.P.L. 65% (90% thru 200 mesh) bulk	5.50
Morriston, Fla.—Analysis, 35% B.P.L.	12.00
Mt. Pleasant, Tenn.—B.P.L. 65 to 70%	5.00@6.50

Florida Soft Phosphate

Raw Land Pebble

	Per Ton
Bartow and Norwills, Fla.—B.P.L. 50%, bulk	6.00@ 8.00
B.P.L. 78%, bulk	13.50
Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.)	3.25
70% (min.)	3.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

	Per Ton
Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Lakeland, Fla.—B.P.L. 60%	6.00
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	6.00@ 7.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	20.00	9.00@14.00
Granville, N. Y. — Red slate granules		7.50
Ingomar, Ohio	12.00@25.00	12.00@25.00
Lincoln, Neb. — Red, white, grey, in bags		30.00
Middlebrook, Mo.—Red granite; sacks	28.50@30.00	20.00@22.50
Milwaukee, Wis.		30.00
New York, N. Y.—Red and yellow Verona		32.00
Phillipsb'g, N. J.—Green stucco dash		9.00@14.00
Piqua, O.—Marble		7.00@ 9.00
Poultney, Vt. — Roofing granules		3.75
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.	12.00	14.00
Wausau, Wis.	14.00@18.00	

Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@35.00
Bellows Falls, Vt.	18.00	25.00
Birmingham, Ala.	13.50	25.00@35.00
Bridgeport, Conn.	31.00	32.00
Carpenterville, N. J.	16.00	32.00@65.00
Easton, Pa.	16.00	40.00@60.00
Eugene, Ore.	22.50@25.00	50.00@75.00
Rochester, N. Y.	21.00	
Friesland, Wis.	20.00	
Houston, Tex.		19.50
Lockport, N. Y.	16.00	
Omaha, Neb.	18.00	30.00
Piqua, O.	15.00	25.00
Phoenix, Ariz.	16.00	35.00@80.00
Portland, Ore. (Del'd)	21.00	30.00@60.00
Puyallup, Wash.	20.00	35.00@85.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@35.00
Salem, Ore.	25.00@30.00	35.00@75.00
Salt Lake City, Utah	18.00	35.00
Seattle, Wash.	18.00@22.00	35.00@75.00
Springfield, Ill.	18.00	29.00@25.00
Tampa, Fla.	15.00	25.00@65.00
Wauwatosa, Wis.	13.00@14.00	26.00@65.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	7.00
Barton, Wis.	8.50
Boston, Mass.	13.00@14.00
Brighton, N. Y.	14.75
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
El Paso, Texas	13.00
Gary, Ind.	11.50@12.00
Grand Rapids, Mich.	12.00
Lancaster, N. Y.	12.50
Michigan City, Ind.	10.00
Milwaukee, Wis.	12.00@13.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Redfield, Mass.	15.00
Rives Junction, Mich.	11.00
Saginaw, Mich.	11.50
San Antonio, Texas—Common	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	18.00
F. o. b. cars	16.00
Washington, D. C.	13.50
Winnipeg, Can.	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	19.00	16.00
Baltimore, Md.	15.00	13.00
Boston, Mass.	23.00	20.00
Cincinnati, Ohio	19.60	14.50
Chicago, Ill.	18.00	.....
Dallas, Tex.	25.00	.....
Denver, Colo.	30.00	.....
Detroit, Mich.	15.25	13.25
Fort Dodge, Ia.	19.70	17.00
Grand Rapids, Mich.	15.65	.....
Los Angeles, Calif.	30.00	30.00
Minneapolis, Minn.	29.00	22.00
Montreal, Que.	21.00	21.00
New Orleans, La.	.....	17.25
New York, N. Y.	16.99	.....
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	18.00
Seattle, Wash.	27.00	.....

	Lump per 180-lb. Barrel (net) Finishing	Common
Atlanta, Ga.	2.00	1.50
Baltimore, Md.	.....	12.00†
Boston, Mass.	3.35	3.10
Cincinnati, Ohio	.....	12.25
Chicago, Ill.	.....	1.40
Denver, Colo.	.....	2.95
Detroit, Mich.	11.50†	10.50†
Los Angeles, Calif.	3.00*	3.00*
Minneapolis, Minn.	1.70	1.40
New Orleans, La.	.....	1.75
New York, N. Y.	.....	3.69*
St. Louis, Mo.	.....	.70*
San Francisco, Calif.	.....	1.90
Seattle, Wash.	3.25	2.75

*280-bbl. (net). †Per ton.

Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga. (bags)	3.45
Boston, Mass.	2.61
Cedar Rapids, Ia.	2.31
Cincinnati, Ohio	2.45
Cleveland, Ohio	2.36
Chicago, Ill.	2.07
Dallas, Tex.	2.30
Davenport, Ia.	2.24
Denver, Colo.	2.69
Detroit, Mich.	2.37
Duluth, Minn.	2.04
Indianapolis, Ind.	2.31
Kansas City, Mo.	2.30
Los Angeles, Calif.	3.20
Milwaukee, Wis.	2.26
Minneapolis, Minn.	2.34
Montreal, Can. (sacks 20c extra)	2.40
New Orleans, La.	2.80
New York, N. Y. (includes bags)	2.40
(10c per bbl. discount in 10 days)	
Pittsburgh, Pa.	2.12
Portland, Ore.	3.05
St. Louis, Mo.	2.10
San Francisco, Calif.	2.63
St. Paul, Minn.	2.34
Toledo, Ohio	2.39
Seattle, Wash.	2.94

NOTE—Add 40c per bbl. for bags.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ⅜x32x36" Weight 1500 lbs. Per M Sq. Ft.	⅜x32x36" Weight 1850 lbs. Per M Sq. Ft.	Wallboard, ⅜x32 or 48", Lengths 6'-10', 1850 lbs. Per M Sq. Ft.
Douglas, Ariz.	.....	.....	6.00	13.00	.....	10.50@12.00	.....	.....	.....	11.50@13.50	.....	.....	.....
Fort Dodge, Ia.	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	.....	.....	.....
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	4.00	6.00	9.00	9.00	9.00	.....	.....	27.75	21.00	19.38	20.00	30.00
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Winnipeg, Man.	5.50	5.50	7.00	15.00	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.
*Shipment in bulk 25c per ton less; ‡Bond Plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional; ||Bulk; (a) Includes sacks.

Accident Prevention

Safety by Use of Compressed Air Machinery and Equipment

SAFETY is often aided by the substitution of compressed air or other mechanical power for hand labor. For example, the use of air hoists for handling materials eliminates much of the danger of pinched fingers, crushed feet, and strained backs.

This use, however, introduces new hazards that can be eliminated only by proper care in installing, maintaining, and operating the compressed air equipment. Within the past few years a number of persons have been killed or injured by explosions of air compressors and receivers, and by the introduction of compressed air into the eyes, ears, and other openings in the body. These accidents have been given widespread publicity so that today considerable thought and engineering skill are being devoted to the prevention of such accidents and to the elimination of other hazards that are involved in the operation of compressed air machinery and equipment.

Air Compressors

It is essential that the compressor should be strongly built, installed on a firm foundation, and securely fastened in place. Air compressors usually have extremely variable loads, for as the pressure in the air receiver fluctuates above or below normal, the compressor speed is changed or the compressor is automatically unloaded and loaded. This sudden and frequent variation of the load causes considerable vibration and imposes a severe shock upon the compressor and its foundation. The strain on the flywheel is usually severe and special allowance should be made for it when the wheel is designed. Proper design and care of speed governors are also extremely important.

At each installation the compressor should be of such size and capacity that it is unnecessary to operate at a speed greater than that listed by the manufacturer. Excessive speed develops too much heat, which increases the danger of explosion.

It is of course advisable to install guards for compressor belts, pulleys, flywheels, flywheel pits, cranks, etc. Complete enclosure is desirable, but where this is impracticable, guards should be constructed as specified in the Council's Safe Practices pamphlet No. 9 on "Engine Guarding and Engine Stops."

Other important points in connection with compressors are proper lubrication, cooling of air cylinder, inter and after cooling of the compressed air, and providing an intake of cool, clean air, as discussed in succeeding paragraphs.

Compressor Lubrication—Some persons attribute air-compressor explosions to the volatilization of the lubricating oil and the ignition of the resulting oil vapor. Whether this is true or not, the fact nevertheless remains that the temperature of the air is increased considerably in the process of compression. At a pressure of 100 lbs. the temperature in an air cylinder often reaches 400 deg. F. This is sufficient to volatilize certain grades of lubricating oil whose flash points are below this temperature. (The flash point of any substance is the minimum temperature at which it gives off a flammable vapor.) When added to the compressed air, this oil vapor may form an explosive mixture which may be ignited by the temperature of the compressed air or by a glowing bit of carbon. It would, therefore, seem advisable in lubricating the air cylinder of air compressors to use oils that have high flash points.

Operators should also be careful not to supply too much oil to air compressors, as excess oil may increase the danger of explosion. Air compressors do not require as much oil as steam engines, for unlike the condition in a steam cylinder, the cylinder walls of an air compressor are dry; there is no steam or moisture to wash the oil from the wearing surfaces. It is best to feed the oil into the cylinder by means of a sight-feed lubricator. The usual recommendations provide for the feeding of 1 to 4 drops of oil per minute for small compressors, 6 drops for those of medium size and 10 to 12 for very large compressors. If it is impossible to operate satisfactorily with this quantity of oil, perhaps the wrong grade of oil is being used. It is always best to consult some reputable oil company and use the grade of oil which it recommends.

The danger of explosion is also increased because of the decomposition (burning or cracking) of the lubricating oil. Only high-grade mineral oil, therefore—not vegetable or animal oils—should be used. Even the best oil when exposed to intense heat in the air cylinder decomposes to some extent and leaves a deposit of carbon on the cylinder walls which may even be carried over into the discharge pipe and the air receiver. This carbon deposit is flammable, it soon becomes oil-soaked, is under considerable air pressure, and exposed to great heat, so it readily glows and may even burn, thus igniting any flammable or explosive mixture of oil vapor with which it might come into contact.

The burning of this carbon may also heat certain spots on the wall of the air cylinder, pipe, or receiver to such a high temperature that it can no longer withstand the pressure of the air and therefore bursts with explosive violence. Besides the damage done by a rupture in the air cylinder, there is the additional danger that a rupture may cause the receiver or some of the pipes to burst. If this happens, it might liberate the oil that may have accumulated in the receiver or in some other part of the air system. If in the form of a mist or spray, this oil may mix with the air, ignite from a boiler fire or some other flame, and explode. *(To be continued)*

One of the illustrations from the pamphlet "Safety Bulletins and Bulletin Boards"

As Interesting as a Newspaper

Shop Bulletin Boards can be made as interesting as the daily newspaper. Just as the press molds public opinion in questions of public interest, so the shop bulletin board determines workers' opinions with reference to safety. To secure maximum results from shop bulletin boards, however, it is necessary to know:

1. What types of bulletin boards are best.
2. What ones to buy—or how to make them in your own plant.
3. Where they should be located.
4. What bulletins are the most effective.
5. How often the bulletins should be changed, etc.

All these and many other questions are answered in the National Safety Council's pamphlet on "Safety Bulletins and Bulletin Boards." If you are interested in preventing accidents to your workers you should not fail to read it. Other companies following the methods outlined therein have reduced accidents 25, 50, and even 80 per cent.

A copy of the pamphlet and sample safety bulletins will be sent free on request.

National Safety Council
Non-Commercial Dept. R Not-for-Profit
168 N. Michigan Ave., Chicago

News of All the Industry

Incorporations

The Limestone Products Co. has been incorporated in Menominee, Mich., for $25,000.

The Minnesota Lime and Cement Co., St. Paul, Minn., has been incorporated for $25,000 by A. L. LeRue and R. H. Currie.

The Island Gravel Co., Worthington, Ind., has been incorporated for $5000 by R. E. Winger, C. G. Trent and J. W. Calvert.

The Oakway Sand and Gravel Co. has been incorporated with offices at 53 Buhl building, Detroit, Mich., with a capital of $50,000.

The Utah Potash Co., Inc., has been incorporated at Wilmington, Del., for $8,200,000 and will engage in mining of potash.

The Britton Crushed Stone Corp., Rochester, N. Y., has been incorporated for $150,000 by W. N. Britton and H. P. Rupert.

The Ashland Granite Co., has been incorporated in Ashland, Ore., with a capital of $150,000 to operate a quarry, by E. V. Carter, J. P. Wolf and H. H. Elhart.

The Albemarle Soapstone Co., Esmont, Va., has been incorporated for $150,000, with H. P. McCary as president and E. W. Scott, Jr., secretary.

The Harding and Coswell Stone Products Co., Ellettsville, Ind., has been incorporated for $15,000 by P. M. Coswell, W. C. Reeves and Clara Harding.

The American Rock Asphalt Co. has been incorporated in Valliant, Okla., for $100,000 by H. C. Clark of Valliant, R. P. Taylor and T. E. Webber of Texanna, Okla.

The Mount Vernon Sand and Gravel Co., Mt. Vernon, Ohio, has been incorporated for $50,000 by R. M. Lamb, W. J. Sperry, C. R. Smith, M. S. Lewis, F. J. Martin and F. W. Kahrl.

The Marion Central Sand Co., has been incorporated in Marion, W. Va., with a capital stock of $100,000 by H. H. Lanham and D. H. Morgan of Fairmont, W. Va., and G. W. Otto of Wheeling, W. Va.

The Minnesota Slate Co., St. Paul, Minn., has been incorporated for $150,000 by G. W. Edwards of White Bear Lake, Minn., and G. H. Van Harvey, 1022 Merchants' National Bank building, St. Paul.

Sand and Gravel

The Island Supply Co. has established a distributing yard for masons' supplies at Hollis, N. Y.

The Denton Sand and Gravel Co., Pacific, Mo., is now in full operation, and getting out 5 cars of material per day.

The Moser Sand and Gravel Co. has been incorporated at Golden Valley, Minn., for $50,000 by R. W. Moser, C. E. Oberg and V. Betzold.

The Clear Lake Sand and Gravel Co., Mason City, Iowa, is operating its plant 24 hr. per day. The large demand for materials has made this necessary.

Hartford City, Ind.—Gravel of finest quality is being taken from Big Lick creek on the Robert Stewart farm. Over 1,000 yards have been taken.

The Wear Sand Co., the oldest plant in Topeka, has just opened another plant in North Topeka. Its capacity has grown from 3 to 30 cars per day. Its product is used for road building, concrete work and plastering. The plant is owned by N. S. and T. G. Wear.

The Huntington Gravel Co., allied with the Erie Stone Co., has been incorporated at Huntington, Ind., for $100,000 by N. R. France, G. A. France, W. G. France and E. H. France all of Toledo, Ohio, and C. W. McKeel and W. Lucas of Huntington.

The White Rock Silica Sand Co., south of Strasburg, Ohio, which has been inactive for the last two years, resumed operations under the management of G. A. Evans. Mr. Evans is the Dover superintendent of the Penn Mold and Mfg. Co., and the plant has been opened to supply the Penn company with the high grade silica sand which it produces.

The Interstate Sand and Gravel Co., Chicago, Ill., announces that due to the constantly increasing volume of business it has secured larger quarters for its Chicago office, in the Union Fuel Building. The hydraulic dredge now being installed at Libertyville will also be an advancement in the production of sand and gravel. The Libertyville plant has commenced its season's operations and the company is making shipments of torpedo sand, roofing gravel and concrete gravel.

Cement

The International Cement Corp., has re-elected its retiring directors.

The B. C. Cement Co., Victoria, B. C., has shipped 5,000 bbls. of cement to Manila.

Ningpo, China—Merchants of this city propose to organize a cement factory in Hangchow.

H. B. Moore and W. M. Snyder, of Windham, N. Y., have contracted with the Hugh Nawn Contracting Co., to draw all cement from Grand Gorge to Gilboa.

Mount Morris, N. Y.—Palermo Brothers have contracted to supply 13,000 bbls. of Alpha cement, about 65 carloads, to J. W. Copper Co., Buffalo, who have a contract to erect a breaker, hoisting engine house, machine house, office and garage at Retsof for the Retsof Mining Company.

The Oklahoma Portland Cement Co., Ada, Okla., after installing a new kiln in the "wet process" plant, a new power plant which will be in operation early next year, is engaged in work on its "dry process" plant, getting it in readiness for re-opening. Output of cement products will be increased almost double before the first of next year, it is believed.

San Antonio, Tex.—More than 100 bbls. of cement are needed daily for the street repair, bridge and other construction work carried on at San Antonio. Bids will be called at an early date for 10,000 bbls. of cement for the city's supply for the next three months according to announcement from City Purchasing Agent, A. I. Dunnica.

Concrete Products

The American Tile and Cement Co., Baltimore, Md., has increased its capital stock to $25,000.

The Royalton Eagle Brick Co., Harrisburg, Pa., recently made a shipment of 1,000,000 bricks to Philadelphia.

The Spencer Cement Block Works, Inc., Spencer, Iowa, has been incorporated for $50,000. A. Nelson is president, G. Stebbins, vice-president; G. C. King, secretary and treasurer.

The McGovern Wring Co., Hibbing, Minn., is building an addition to its block factory in Brooklyn, increasing the factory's capacity of 3,000 blocks a day to between 5,000 and 6,000.

The Cement Block & Brick Co., Weymouth, Mass., has been incorporated for $10,000 by J. G. Clark, G. H. Hatchard and K. B. Nichols, all of Hull, to deal in cement building material.

Sand & Gravel

The Rochester Duntile Products Corp., Rochester, N. Y., has been incorporated for $40,000 to deal in all kinds of tile, bricks, etc., by R. L. Curtis, C. D. Thomy of Rochester, and G. H. Muth of Philadelphia, Pa.

The Wyomissing Cement Products Co., North Wyomissing Heights, Pa., has been incorporated for $10,000 and will engage in the manufacture of cement blocks, bricks, etc. Incorporators are F. Wilson, J. N. Klein and L. D. Gilder.

The Cement Products Co., Davenport, Iowa, reports demands are increasing for cement blocks, used chiefly in construction of houses. The company added to the floor space of its plant and the new equipment enables it to increase its output to between 1,400 and 1,500 concrete blocks per day.

Quarries

The Washington Marble Products Co., Chewelah, Wash., is planning the enlargement of its marble chip plant.

The Magnesite Products Co. has been organized in Escanaba, Mich., and will begin operations at once. L. P. Sullivan is manager.

The Ranger Crushed Stone Co., Ranger, Texas, is to begin operating the Tiffin rock crusher at once. C. Caudle of Joplin, Mo., is superintendent.

The National Marble and Slate Co. has begun the erection of a factory building. The company's offices are at 238 West 55th street, New York City.

The Ranger Crushed Stone Co., Breckenridge, Tex., has a contract from the C. & N. E. for crushing of stone to be used in ballasting their roadbed. The consideration was $65,000.

The Bay Slate Quarry, Milford, Mass., has been sold to G. Fuller & Co., New York, for $54,000. It is reported the new owner will build up the plant with a view to have operations carried on extensively.

The L. D. Smith Stone Co., Sturgeon Bay, Wis., is working a double crew at its quarry at the mouth of the bay. The company has a large number of orders to fill and the boats are making good time in delivering, crowding the crushing plant at the quarry to its fullest capacity.

Gypsum Products

The Grand Rapids Plaster Co., Grand Rapids, Mich., has increased its capital stock from $250,000 to $400,000.

The Owensboro Wall Plaster Co., Owensboro, Ky., has been incorporated for $5000 by W. L. Delker, E. H. Delker, J. T. Harrison and P. A. Yager.

Fairvalley, Okla.—Arrangements are under way to erect a large plaster mill near Fairvalley. A large deposit of the rock known as "gypsite," a soft rock which is easily converted into plaster, and is more desirable than the common rock gyp, which must go through various crushing processes, has been purchased by D. C. Spray, Paul Fennesey of Ponca City, J. I. Monnett of Yale and E. B. Sawyer of Enid, Okla.

Lime

The Vermont Lime Products Co., Danby, Vermont, has been incorporated by J. F. Burke and J. W. Linnehan.

The Missiquoi Lime Works has moved its office from the Champlain Motor Co. building to the Welden National Bank building on Kingman street.

The F. A. Jones Stone and Lime Co., Zanesville, Ohio, has been incorporated for $50,000 by H. R. Jones, Canton, J. R. Foster, Cleveland; F. A. Jones, S. V. Nowak and A. R. Jones of Zanesville, Ohio.

Dealers

Leesburg Sand and Supply Co., St. Petersburg, Fla., has been incorporated for $10,000 to deal in sand, cement and all kinds of building materials.

The Langston Construction Co., Titusville, Fla., has been incorporated with a capital of $50,000 to deal in rock, sand, concrete and other building materials.

The Western Building Materials Co., has been incorporated in Sapulpa, Okla., with a capital of $30,000 by W. A. Killmer of Tulsa, J. M. Davis of Claremore and W. R. Stinnett of Sapulpa.

Obituary

D. P. Thomas, well known cement manufacturer of Kansas City, Mo., died June 19 from heart disease. Mr. Thomas was owner of the Fort Scott hydraulic cement mills.

Manufacturers

The Western Stucco Board Manufacturing Co., has been incorporated in Portland, Ore., with a capital of $25,000 by J. E. Windle, O. F. Braeger and O. S. Strausburg.

The Ideal Concrete Machinery Co., Cincinnati, Ohio, manufacturers of concrete machinery, etc., is contemplating the erection of a new plant to cost approximately $100,000.

The Dublin Granite Quarry Co., Inc., Brooklyn, N. Y., has been incorporated for $100,000 and will engage in manufacturing machinery for quarries. The incorporator is F. Lauro, 107 Navy street, Brooklyn.

The Anchor Concrete Machinery Co., which recently moved a portion of its plant from Rock Rapids, Iowa, to Adrian, Mich., is reported to later move the balance of the plant to Adrian, where it will be close to the casting plant.

The Economy Fuse & Mfg. Co., Chicago, announces the appointment of Charles H. Bluske as district sales manager of the Los Angeles office at 1304 Maltman avenue. Mr. Bluske was formerly connected with the Pacific States Electric Co. of Los Angeles and succeeds George L. Davis. The Pittsburgh sales office of the Economy Fuse & Mfg. Co. has been moved from 2223 Farmers' Bank building at 1006 People's Bank building at Fourth avenue and Wood street.

Trade Literature

Crushers—The Morgan Engineering Co., Alliance, Ohio, in its Bulletin 25 announces the new Weston direct-drive gyratory crusher.

Electrical Machinery—The June bargain sheet of the Gregory Electric Co., Chicago, gives a complete list of the apparatus now in stock at its works.

Belt Conveyors—Bulletin 369 shows illustrations and descriptions of the new material-handling product, the Jeffrey portable belt conveyor, manufactured by the Jeffrey Mfg. Co., Columbus, Ohio.

Excavators and Scrapers—The Sauerman Bros., 1140 Monadnock block, Chicago, are mailing out two new pamphlets. No. 17 describes the process of handling sand with Sauerman dragline cableway excavators, and No. 16 is devoted to bottomless power scrapers.

Pulverizer.—The Bonnot Co., Canton, Ohio, has issued a 12-page folder describing the uses of the Bonnot pulverizer, a complete grinding unit with air separation. Its special features of design and construction are shown in this folder, illustrated by half-tone engravings and blueprints.

Crawler Crane—A four-page folder describing the crawler crane manufactured by the Northwest Engineering Co., Green Bay, Wis. The illustrations show operations of the machine and cites numerous examples of what yardage has been made, the machine's mobility, speed, and capacity.

Power Shovels—The Thew Shovel Co., Lorain, Ohio, is sending out Bulletin 111, showing its ¾-yd. shovel; No. 112 describes the No. OO ½-yd.; No. 201, the Type O electric; No. 501 the steam, gasoline and electric cranes; and No. 601, the Type O gasoline shovel.

Industrial Cars—This catalog of the International Clay Machinery Co., Dayton, Ohio, illustrates some of the designs of standard and special cars and portable and industrial railways supplied by them. The company states that it equips, supplies and builds railroads for all kinds of industrial purposes.

"What the Artist Saw" is a pamphlet issued by the American Rolling Mill Co., Middletown, Ohio, as a souvenir during the visit of the American Society of Civil Engineers to the company's plant recently. With fitting descriptive matter there are 10 pen and ink sketches executed by Raymond Perry of important plant operations.

Paper Pulleys—An interesting 28-page booklet has been issued by the Rockwood Mfg. Co., 1801 English avenue, Indianapolis, describing its paper pulleys for use on dynamos, motors, drop hammers and the like. The advantages of this type of pulley are set forth and its transmitting capacity, weight, etc., shown. There is a price list also included.

Hoisting Engines and Mining Equipment—Catalog 30 of the Ottumwa Iron Works, Ottumwa, Iowa, is a handsomely gotten up 116-page book describing the company's electric and steam hoisting engines and mining equipment, in which is included fans, mine cages, cars, roller-bearing car trucks, sheaves, etc. This company's Bulletin No. 250 similarly describes its hoisting engines and mine equipment.

Boilers—Bulletin WT-2, illustrating and describing the Vogt water tube boilers manufactured by the Henry Vogt Machine Co., Louisville, Ky., outlines the factors which should be given consideration when purchasing water-tube boilers. It also contains the saturated steam tables prepared by Marks and Davis and published by Longmans-Green & Co.

Specification Handbook—The Truscon Laboratories, Detroit, Mich., calls attention to its new Specification Handbook which has just come off the press—a book of 108 pages, size approximately 8¼x11 in. The binding is loose leaf, making the set of specifications adaptable for use either as a reference book for the A. I. A. filing system or for any other classification adopted by the architect's or engineer's office.

Sand and Slime Cones—The Allen Cone Co., El Paso, Texas, in its Bulletin No. 22 describes the operation of its sand and slime cone, and illustrates it with drawings of the cone and pictures of its installations. The means for changing the classifications is also given, as well as installing the cones in closed circuits, closed circuit concentration, use of cones with concentrating table, desliming, dewatering and other uses, building dams and stock piles.

Locomotives—Inclosed in a handy folder are five recent bulletins of the Geo. D. Whitcomb Co., Rochelle, Ill., manufacturers and marketers of mining machinery and haulage equipment. Bulletin 2209 describes and illustrates the various types of gasoline and electric industrial locomotives and their application to and advantages in the industries; Bulletin 2210, the worm-drive storage battery locomotive; Bulletin 2211, road building with the Whitcomb gasoline locomotive; Bulletin 2212, the company's 6-ton gear-drive locomotive; Bulletin 213, "How $22,000 Was Saved on Concrete Road Work by Whitcomb Locomotives." The contractors' costs sheets on the industrial railroad are reproduced and the performance summary given.

Robert W. Hunt Jno. J. Cone D. W. McNaugher

ROBERT W. HUNT & CO.

Inspection—Tests—Consultation

Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

INSPECTION AND TESTS OF SAND, GRAVEL, CEMENT, STRUCTURAL STEEL, CASTINGS AND CONSTRUCTION MATERIALS

Cement, Chemical and Physical Testing Laboratories

CHICAGO
2200 Insurance Exchange

New York St. Louis Kansas City Cincinnati Pittsburgh San Francisco

WE DESIGN AND EQUIP COMPLETE PLANTS

for the manufacture of gypsum products, such as wall plaster, moulding plaster, wall board products, gypsum block products, also mixing plants.

We are prepared to furnish complete machinery-equipment and design and furnish plans for the installation. Consult our Engineering Department. Forty years' experience in designing of wall plaster machinery and plants.

The J. B. Ehrsam & Sons Mfg. Co.
Engineers, Machinists and Founders
Enterprise, Kansas

Western Sales Representative
J. J. Abramson, 612 San Fernando Bldg., Los Angeles Calif.

F. L. SMIDTH & CO.
50 CHURCH STREET NEW YORK

Engineers

CEMENT MANUFACTURING PLANTS
CEMENT MAKING MACHINERY
PULVERIZED COAL INSTALLATIONS
GRANULATING AND PULVERIZING MACHINES FOR ALL MATERIALS
FLINT PEBBLES—SILEX LINING
THE LENIX BELT DRIVE

World famous for shafting and machinery lubrication!

Albany Grease

"All Men Know It Knowing Men Use It"

At Your Dealers!

Adam Cook's Sons
708-710 Washington St., New York

A MARK known and respected around the world — Since 1868 — for fair dealing, a quality product and an unexcelled service

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion

BOILERS

A LARGE STOCK OF HIGH-GRADE BOILERS OF PRACTICALLY ALL SIZES, TYPES AND MAKES, TAKEN OVER FROM DU PONT CHEMICAL COMPANY'S AND OTHER PLANTS WITH PRODUCTION RECORDS—RECONDITIONED, OFFERED SUBJECT TO ANY INSPECTION, AVAILABLE *NOW!*

"SAVE TIME AND MONEY ON YOUR POWER INSTALLATION—LET DAVIS FURNISH THE BOILERS"

LONG DISTANCE TELEPHONE RANDOLPH 2232

J. F. DAVIS

1122-1123-1124 Harris Trust Building CHICAGO, ILL.

FOR RENT AND SALE

20—12-yd. Western dump cars, std. gauge.
50—60,000-lb. capacity flat and box cars.
1—Western standard gauge spreader.
1—Osgood 18 revolving shovel, traction wheels, No. 794, ¾-yd. bucket, used 8 months.
1—Class 14 Bucyrus dragline on caterpillars, 70-ft. boom, 2-yd. bucket, used 6 months.
1—Marion 76 steam shovel, No. 3503, std. gauge, weight 110 tons, used 10 months.
1—No. 2 Brownhoist 4-wheel gas. crane, std. gauge, 40-ft. boom, ½-yd. bucket, new 1921.
64—NEW 18-in. I-beams, 80 lbs. per ft., 40 ft. long, not drilled.
1—NEW Lakewood concrete chuting system.
6—NEW wood-burning locomotive-stacks.

LOCOMOTIVES

1—50-ton 18x24-in. six-wheel switcher.
1—40-ton 17x24-in. four-wheel switcher.
2—NEW 24-ton six-wheel Porters, separate tender, 36-in. gauge.
2—18, 14 and 10-ton Vulcans, 36-in. gauge.

INDUSTRIAL EQUIPMENT CO.
McCormick Building Chicago, Ill.

FOR SALE

2—8x110′ Rotary Kilns
6—5x6x7x110′ Rotary Kilns
3—6x16′ Tube Mills, Silax Lined
9—5x21′ Tube Mills, Steel Lining
6—250 H.P. Oil City Water Tube Boilers
1—Coal Dryer
1—Rock Dryer
8—Krupp Ball Mills
1—No. 8 Austin Crusher
4—Engines, 200 to 500 H.P.
8—33″ Fuller Mills
8—42″ Fuller Mills

Shafting, Pulleys, Bearings, and Elevator Equipment, All First-Class Operating Condition

50 Acres of Land and Five Buildings, Stone and Steel Construction. Located at Stockertown, Pa.

ENGINEERING SALES CO., Nashville, Tenn. OLLIE LAWRENCE, Stockertown, Pa.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½x25′, 4x30′, 5½x50′, 6x60′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 4x40′, 5x50′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 5x4′, 3x3½′ pebble and ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 12x26″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24″, 36″ and 40″ cage mills; 3′ and 4½′, 6′ and 8′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36″ Sturtevant emery mill; one 3′ roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens; Richardson automatic scales; 8′ and 10′ Emerick air separators.

Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa.

1—59-ton standard gauge Baldwin 6-wheel saddle tank switcher.
1—40-ton American 4-wheel saddle tank switcher.
2—50-ton standard gauge Brooks 6-wheel switchers.
1—42-ton standard gauge Shay geared locomotive.
2—18-ton 36″ gauge 4-wheel saddle tanks.
2—23-ton new 36″ gauge Porter 6-wheelers, with tenders.
1—20-ton Industrial Loco. Crane.
1—14-B Bucyrus steam shovel, mounted on traction wheels.

BIRMINGHAM RAIL & LOCOMOTIVE CO.
Birmingham, Ala.

FOR SALE

No. 2 Allis-Chalmers Gates Gyratory Crusher.
No. 3 Austin Gyratory Crusher.
No. 6 Austin Gyratory Crusher.
Two American Process type 24x48″ Rotary Dryers.
50′ continuous steel bucket (8″x16″) and chain elevator.
50′ continuous bucket (7″x13″) and belt elevator.
25 H.P. simple side crank Heilman steam engine.
125 H.P. 18″x24″ side crank Atlas steam engine.
75 H.P. 13″x16″ side crank Erie City steam engine.
Lidgerwood Standard double cylinder, two drum, 10″x12″ hoisting or cableway engine.
Two 150 H.P. General Electric Co. Induction motors, voltage 440 or 220, shop numbers 625140 and 1164925.
Williams No. 9 Swing hammer, Universal type pulverizer.
Worthington 10″ intake by 8″ discharge by 20 cylinders steam pump.
25 tons of 40 to 60 lb. rails.
7—2 yard, all steel, 48″ gauge end dump quarry cars.
One Sanderson cyclone No. 14 electric, non-traction well drill and equipment.

ADDRESS
E. W. Cooper, Engineer
174 3rd Ave. No., Nashville, Tenn.

FOR SALE

1—No. 1 Sturtevant Ring Roll
1—No. 0 Sturtevant Ring Roll

RHODES
157 W. Austin Ave., Chicago

FOR SALE

Two Schmidt No. 66 Kominuters; and one Krupp No. 8 Ball Mill. All in good second hand condition.

Security Cement & Lime Company
Hagerstown, Md.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

Rotary Dryers

30 New Direct Fired Rotary Dryers, 4'-0" Diam. 30 Feet Long

These Dryers were about to be put into operation as the armistice was signed and consequently were never used. We are offering them at a sacrifice, complete with driving mechanism, furnace iron, grates, etc. Some are equipped with steam radiators, for steam heated air drying.

McDERMOTT BROS. CO.
Allentown, Penna.

QUARRY EQUIPMENT

4—20 yd. Steel Underframe Side Dump Cars.
3—16 yd. Steel Underframe Western Dump Cars.
10—1½ yd. Western Dump Cars.
2—10x16 Davenport 36 in. ga. Saddle Tanks.
1—11x16 American 36 in. ga. Saddle Tank.
1—9x14 Porter 4 ft. 8½ in. ga. Saddle Tank.
1—⅝ yd. Thew "O" Traction Shovel.

Walter A. Zelnicker Supply Co., St. Louis

"DREDGING PUMP" FOR SALE

One 10" Morris Sand and Gravel dredging pump, 10" suction, 10" discharge, direct connected to double 9x9 engines.
One Scotch Marine Boiler, 200 H. P.

M. A. CALLAHAN
"The Sand Man"
Schofield Bldg. Cleveland, Ohio

FOR SALE

1 screen 4 ft. diameter x 10 ft long, punched 2 in.
1 screen 3 ft. diameter x 10 ft long, punched ¾ in.
1 screen 3 ft. diameter x 10 ft. long, punched ¼ in.
1 sand pan goes with each screen.
1 9x15 Blake Stone Crusher.
1 automatic sand settling tank.

All equipment in good second hand condition.

Clermont Brick & Sand Co.
Clermont, Iowa

FOR SALE

1—De La Vergne 50-hp. Oil Engine in very good condition—Cleveland, Ohio.

1—No. 0 Thew Steam Shovel, ⅝-yard dipper, in good condition—Somerdale, Ohio.

Attractive Prices—Immediate Delivery.

The Superior Sand Company
511 Guardian Building CLEVELAND, OHIO

H. E. WIEDEMANN
(Est. 1905)
Consulting and Analytical Chemist
Specialist in Analysis of Rock Products
Chemical Bldg. St. Louis

IMMEDIATE DELIVERY

SEND US YOUR STEAM SHOVEL INQUIRIES

66x86 in. TRAYLOR JAW CRUSHER.
No. 18K GATES CRUSHER.
50-75 HP. Single Drum Hoists, 25 Cy. Motors.
25-40-50 HP. D.D. Hoists, 60 Cy., 220-440 V., 3 Ph.
Nos. 3-5-6-7½ & 8K CRUSHERS.
6 and 12 ton Gasoline Locomotives.
10x12 in. Steam Hoist, 3 Drum.
2—DISC CRUSHERS, 36" SYMONS.
2—60 ft. BARBER-GREEN 18" BELT CONVEYORS.
100 TON 2½ YD. ELEC. SHOVEL.
50 to 5000 ft. Steam, Belt & Elec. Compressors.
JAW and ROLL CRUSHERS.
10-15 & 20 Ton Locomotive Cranes.
13x30 in., 9x14 in. and Other Jaw Crushers.
24x54 McLANAHAN ROLL CRUSHER.
Send us your inquiries for Steam Engine, Centrifugal Pumps, Quarry & Cont. Equip., Etc.

ROSS POWER EQUIP. CO., Indianapolis, Ind.

FOR SALE

Equipment in Excellent Condition

1—Monighan All Steel, Steam Drag-Line Excavator, 60-ft. Boom.
1—Marion 45 Ton Steam Shovel (Railroad Type).
4—Ore Dump Cars, Steel, Standard Gauge, 100,000 lbs. capacity. Nearly new.
2—Wooden Dump Cars, Standard Gauge, 80,000 lbs. capacity.

Selling the above equipment because we have installed Hydraulic Dredge.

INTERSTATE SAND & GRAVEL CO.
123 West Madison St., Chicago

Take advantage of the Opportunity offered in the Used Equipment Department to dispose of the equipment that you no longer need.

Classified Advertising

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

FOR SALE

92 acres of high calcium limestone, the purest limestone in the United States. Analysis 99.10 calcium carbonate. Located at St. Genevieve, Mo. For full particulars apply

J. F. SCHUERMANN
Syndicate Trust Bldg. St. Louis, Mo.

SUPERINTENDENT
and Master Mechanic

18 years' experience in designing, erecting and operating crushed stone, pulverizing, and concentrating plants, just completing work on large plant, now open for new position. Highest references. If you want a man that knows how and can get the work through, address

Box 1572, care ROCK PRODUCTS
542 So. Dearborn St. Chicago, Ill.

WANTED

Traveling Salesman in Missouri and Illinois for old established Lime and Building Material Company; permanent position with future for the right party. Give full particulars in first letter, including experience and salary wanted. Address

Box 1573, Care of Rock Products
542 South Dearborn Street Chicago, Illinois

QUARRYING BUSINESS FOR SALE

Located Central Pennsylvania. Now in operation. Favorable freight rates. Low royalty on stone.

Winston & Co., Muncy, Pa.

WANTED

Foreman to take charge of the mixing and shipping departments of gypsum plaster mill. One who is experienced in testing. Address

Box 1570, Care Rock Products
542 South Dearborn Street, Chicago, Ill.

Take the "Hand" Out of Handling

Use an O. S. Dependable Crane

and increase your profits by reducing your costs.

Catalogues 18 and 21 should be in your files.

Sent Upon Request

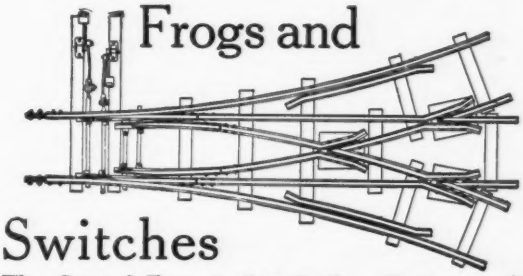
Orton & Steinbrenner Co.
Main Offices
608 So. Dearborn St.
Chicago, Ill.
Shops—Huntington, Indiana

BYERS *Model "10"*
Full Circle Crane

OPERATOR can raise or lower the boom *under absolute control* while lifting or dropping bucket, rotating, or traveling. Exclusive Byers feature; many other points just as important—study them *all* in interesting Bulletin, just out.

• • •

The Byers Machine Co.
310 Sycamore St., Ravenna, O.
Agents in Leading Cities



Frogs and Switches

The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fishplates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.

THE McMYLER

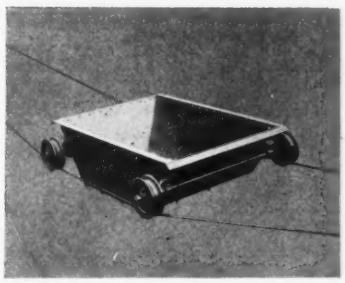
THERE is power built into each machine, a ruggedness that can be depended on to stretch out into months and years of flawless service.

Try out the Type "J" Locomotive Crane and its operation will convince

THE McMYLER INTERSTATE CO.
Cleveland, Ohio

BRANCH OFFICES:

New York City, 1756 Hudson Terminal Building
Chicago, Ill., 812 Edison Bldg.
Seattle, Wash., Hoge Building
Denver, Colo., 18th and Wazee Streets
San Francisco, Calif., 766 Folsom Street
New Orleans, La., 444 Maison Blanche Annex
Birmingham, Ala., Brown-Marx Building
Boston, Mass., 261 Franklin St.



Automatic Aerial Tramway

The Costs of
Installation
Maintenance
and
Operation
Justify its use at mine or quarry

INTERSTATE EQUIPMENT CORP.
25 Church Street New York City

CARS

WE MAKE CARS FOR COAL, ORE, STONE, SAND, GRAVEL, CLAY AND BRICK. DRYER AND INDUSTRIAL CARS. THE WATT FACTORY IS THE LARGEST IN THE WORLD DEVOTED ALONE TO CAR BUILDING OVER 50 YEARS' EXPERIENCE

CATALOGS

The Watt Mining Car Wheel Co.
BARNESVILLE, OHIO

Electric Motors and Generators

for all requirements of the Rock Products Industry

BURKE ELECTRIC CO.
Main Office and Works
Erie, Penna.
Service Sales Offices

Buffalo
New York
Cleveland
Philadelphia
Detroit
Pittsburgh

Sales Agencies
Underwood Electric Co., Cincinnati
W. T. Osborn, Kansas City.

STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY

Crushing, Grinding, Pulverizing,
Screening, Sizing, Air Separating, Mixing,
Weighing, Elevating and Conveying Machinery
Complete Units -:- -:- Engineering Service

STURTEVANT MILL CO., HARRISON SQUARE BOSTON, MASS.

TERRY FAMOUS DERRICK IRONS, FITTINGS AND ERECTORS' TOOLS

FULL CIRCLE CRANES. "EQUIPMENT THAT LASTS." TIMBER & STEEL DERRICKS

LET US SOLVE YOUR MATERIAL HANDLING PROBLEMS.

All Types of
Steel and Timber
DERRICKS

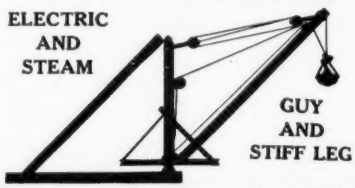
TERRY

HOISTS

TRADE MARK
MUNDY
ESTABLISHED 1869

DERRICKS

ELECTRIC AND STEAM



GUY AND STIFF LEG

"RUGGED, DURABLE EQUIPMENT"

J. S. MUNDY HOISTING ENGINE CO.
NEWARK, N. J., U. S. A.

PERFORATED SCREENS
and Steel Plate Work

W. TOEPFER & SONS COMPANY
Milwaukee Wisconsin

FLORY HOISTS
CABLEWAYS
DREDGING MACHINERY
A Flory Hoist for Every Purpose
CATALOG ON REQUEST
S. FLORY MFG. CO.
BANGOR, PENNSYLVANIA
New York, 95 Liberty St.; Pittsburgh, House Bldg.; Birmingham, Chas. T. Lehman; Chicago, Monadnock Block; Hartford, K. B. Noble Co.; Huntington, W. Va., Banks Supply Co.

SCREENS
OF ALL KINDS

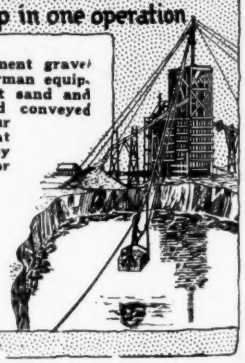
Chicago Perforating Co.
2445 West 24th Place
Tel. Canal 1459 CHICAGO, ILL.

SAUERMAN DRAGLINE CABLEWAY EXCAVATORS
dig, convey, elevate and dump in one operation

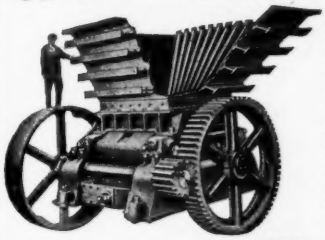
Cost data furnished by prominent gravel producers who are using Sauerman equipment backs up our claim that sand and gravel can be excavated and conveyed from pit to plant by one of our drag-line cableway excavators at a lower cost per ton than by using any other equipment or combination of equipment.

Write for Catalog No. 7

Sauerman Bros.
1140 Monadnock Bldg.
Chicago
Also Mfrs. of Power Scrapers



"PENNSYLVANIA" Single Roll Crusher



The New Series of "Pennsylvania" Single Roll Crushers take steam-shovel feed of limestone, cement rock, gypsum and similar materials, — wet and sticky, — without feeder, and make maximum reduction in one operation. All parts readily accessible. Maintenance cost lower per ton than for any other type. Massive construction — Reliable Safety Devices — Convenient adjustment. Capacities 5 to 450 tons hourly.

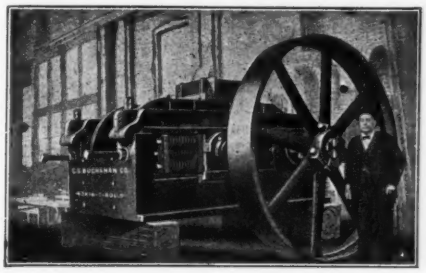
Put Your Reduction Problems Up to Us

PENNSYLVANIA CRUSHER COMPANY

Stephen Girard Bldg., Philadelphia

New York
Pittsburgh

BUCHANAN CRUSHING ROLLS



Type "C" Buchanan Box Bed Crushing Rolls for Heavy Duty Bulletin No. 13

Years of manufacturing experience, combined with an intimate knowledge of the conditions under which such machines operate, assures the purchaser of Buchanan Equipment machines of remarkable durability.

COMPLETE CRUSHING PLANTS

C. G. BUCHANAN CO., Inc.

Cedar and West Streets NEW YORK CITY

BACON-FARREL ORE & ROCK CRUSHING-WORLD KNOWN ROLLS-CRUSHERS

EARLE C. BACON, INC. ENGINEERS
26 CORTLANDT ST., NEW YORK

Equip Your Bins with Robins Gates

They are CORRECT IN DESIGN, RUGGED IN CONSTRUCTION and LOW IN PRICE

Single and Duplex Cut-off Gates in all standard sizes *can be shipped from stock.* Single and Double Rack and Pinion Gates for every service.

Write for Prices and Particulars

ROBINS CONVEYING BELT CO.

New York Chicago Pittsburgh Boston

THE STANDARD OF EXCELLENCE

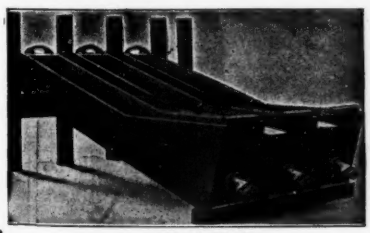
BALDWIN

Industrial and Contractors' LOCOMOTIVES

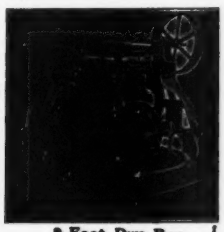
are in use where dependable motive power is required.

Full information upon request

The Baldwin Locomotive Works
PHILADELPHIA



Sand Washers



9-Foot Dry Pan

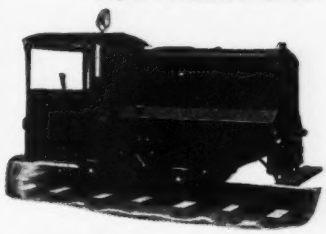
Lewistown Foundry & Machine Co.

LEWISTOWN, PA.

Builders of heavy duty crushers and glass sand machinery. Glass sand plants equipped complete.

Write for prices and catalog

WHERE THERE IS REAL WORK TO BE DONE YOU WILL FIND A "MINSTER"



Model "F" in 6-, 7- and 8-Ton Sizes

Equip right—make the first cost the last cost.

No other Locomotive surpasses the "Minster" for service and lasting economy.

The Industrial Equipment Co.
310-316 Ohio Street
Minster, Ohio

Eastern and Export Dept.
The Herbert Crapster Co., Inc.
1 Madison Avenue
New York City

BEAUMONT
ROCK CRUSHERS

Built for great strength where hard crushing, portability and efficiency are required

Size	Jaw Opening	Tons Per Hour	H.P. Required	Weight
9	9″x15″	12-18	15	8,500
10	10″x20″	16-24	18	12,300
12	12″x26″	25-35	25	19,900

Immediate Shipment can be made on above size Crushers.

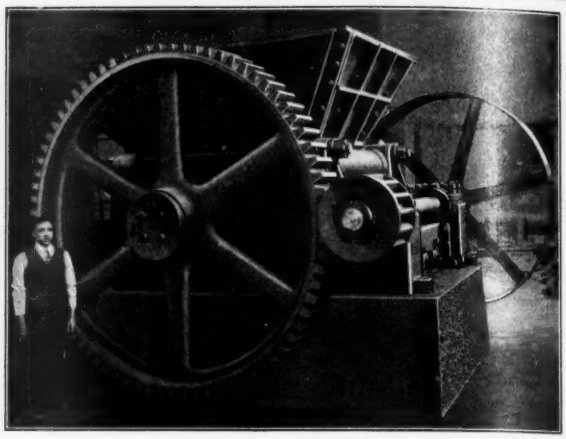
Beaumont Screens
Beaumont Elevators

Send for prices and full information on our equipment.

Manufactured by

H. J. KALTENTHALER

236 Cherry Street Philadelphia, Pa.



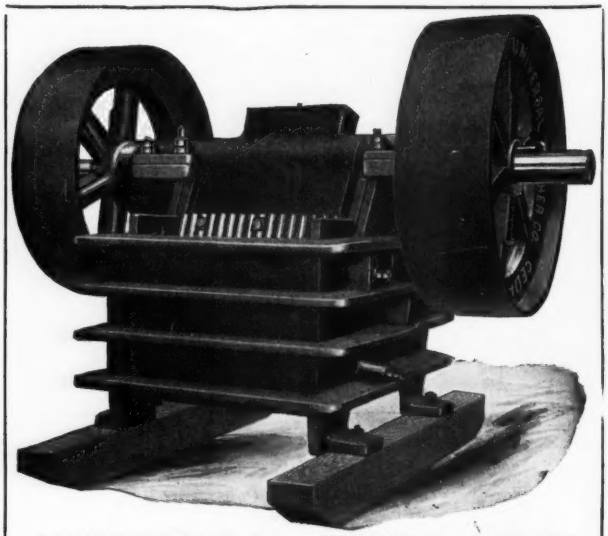
If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.
Hollidaysburg, Pa.

Screens, Elevators, Conveyors, Rock Washers, Etc.



UNIVERSAL STEEL LINE

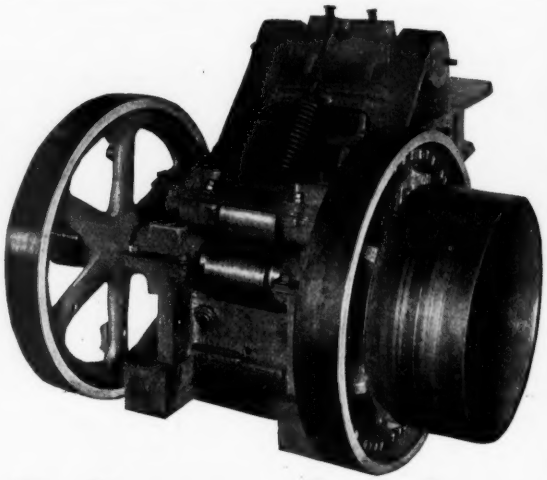
THE PERFECT GRAVEL AND REJECTION CRUSHER

Sizes up to 8″x36″. Capacities 20 to 200 tons daily. Crushes to ¾″ and finer if desired. Has no superior for FINE CRUSHING and UNIFORMITY of product.

STRONG LIGHT DURABLE ECONOMICAL

UNIVERSAL CRUSHER CO.

225 Third Street Cedar Rapids, Iowa, U. S. A.



Reliance Crushers

IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

Universal Road Machinery Co., Kingston, N. Y.

Branches in all principal cities in U. S. and Canada

MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT

OSGOOD

BEST BY TEST

"ASK THE USER"

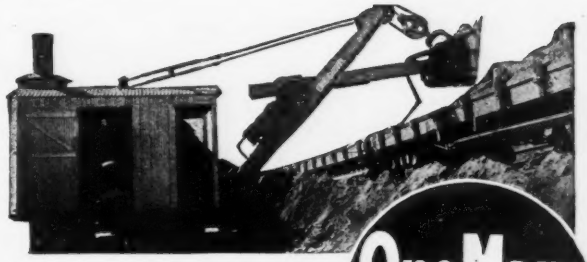
OSGOOD ¾ and 1 cu. yd. Revolving Shovels are noted for their ability to produce more yards at less cost due to their rigid and sturdy construction, simplicity of operation and long life.

Every piece of the Traction or Continuous Mountings is of open-hearth, annealed cast steel. Quick Acting Power Steering Devices, Horizontal Hoisting Engines, Vertical Submerged Tube Type Boilers and the fact that Crane, Clamshell or Dragline features can be added now or later are IMPORTANT TO YOU.

Write for General Catalog 122-M.

THE OSGOOD COMPANY

Marion, Ohio, U. S. A.



One Man; 350 Tons

When you require an output of 800 to 1,000 tons of sand or gravel per day, a fireman is needed in addition to the steam shovel operator. But when you are getting out 350 tons a day, or less, one man can often both operate and fire an ERIE Shovel. The Cumberland Sand Co., of Cumberland, Md., write us:

"Our labor cost is only a trifle; one man operates and fires our ERIE and keeps it in repair. The saving of labor means more efficiency, and our output has increased considerably. To any prospective purchaser, we recommend the ERIE."—**A. K. Smith, Manager.**

Every ERIE Shovel easily and quickly changed over to Locomotive Crane to handle clamshell bucket.

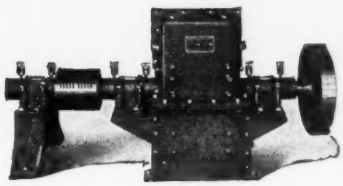
The ERIE is very strongly built; gives steady service in hard work. Its output compares VERY FAVORABLY with that of larger and more costly shovels.

We will be glad to send you a bulletin showing just what the ERIE Shovel can do. Write for Bulletin P-16.

Erie Steam Shovel Co., Erie, Pa., U. S. A.
Builders of ERIE Steam Shovels and Locomotive Cranes

ERIE Revolving Shovels

"K-B" ALL-STEEL PULVERIZER



High Production
Low Power Cost

The efficiency of any machine lies in its ability to do a large amount of work with a small consumption of power.

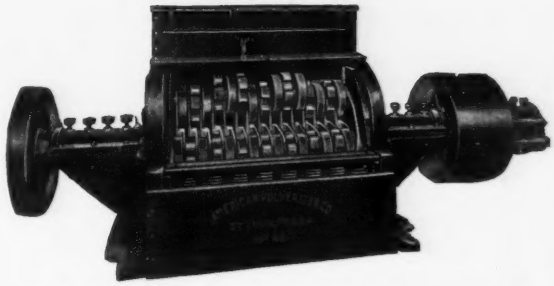
The "K-B" does this!

Ask us for full information

K-B PULVERIZER

K-B Pulverizer Company, Inc.
92 Lafayette Street, New York

American Ring Pulverizer and Crusher



It Represents the Latest Development in Crushers and Pulverizers

It is a superior machine capable of reducing Limestone to the desired fineness for agricultural purposes with the low cost of upkeep and power.

The flexibility of the Ring is the important feature.

Write us for particulars

AMERICAN PULVERIZER COMPANY

General Office and Factory: 18th and Austin Sts., St. Louis, Mo.

There is a bushing at every wearing point in the Pierce-Arrow mechanism. These bushings take the wear. They are "parts insurance" saving costly replacements. Check this vital item in the truck you think of buying.

Pierce-Arrow
TRUCKS

The Pierce-Arrow Motor Car Company
Buffalo, New York

2-ton $3200 3½-ton $4350 5-ton $4850 fully equipped

The Clyde Lime Hydrator Performance Counts

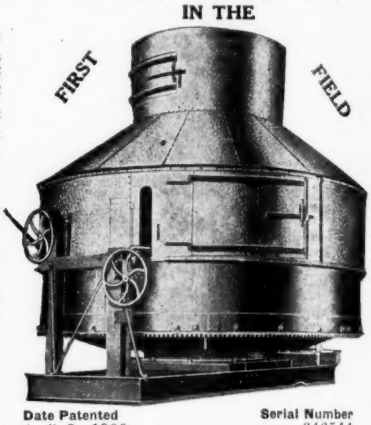
The Clyde was first in the field, and through dependable and economical performance is still first choice of lime operators.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate and most economical in cost of installing, maintaining, and operating.

IN THE FIRST FIELD



Send for Catalog

Date Patented	Serial Number
April 3, 1900	646544
October 10, 1905	801329
November 29, 1921	1398238

H. MISCAMPBELL
Patentee and Sole Manufacturer
DULUTH - - MINNESOTA

AMERICAN GASOLINE LOCOMOTIVE

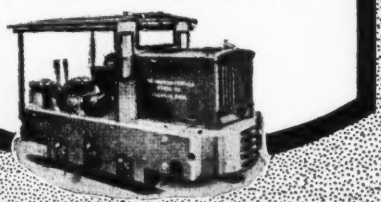
An Ideal Machine to Produce Continuous Haulage at Minimum Cost

If you have haulage work to do, let the Gas-O-Motive do it. The engine is so simple in construction, so ruggedly built, that it can go through the severest service—service that would put other apparatus out of commission—and come out ready for the next job. "Gas-O-Motives" rarely visit the repair shop.

If you have a haulage problem send us your name and address.

"Over a 2,000 foot grade, ranging from 5 to 7 percent, the American Gasoline Locomotive hauls two cars of 2½ yard capacity each, and does it constantly. It works perfectly." Okmulgee Brick Co., Okmulgee, Okla.

THE HADFIELD-PENFIELD STEEL CO.
George G. Stein, Mgr. Gasoline Locomotive Sales Dept.
404 Hippodrome Bldg. CLEVELAND, OHIO



WHEN in the market for machinery or equipment, look through the advertisements of ROCK PRODUCTS. If you do not find what you want advertised in this issue, write us and we will put you in touch with reliable firms who can supply your need. This service is free to our readers. Use it.

Rock Products

The Nation's Business Magazine of the Rock Products Industry

542 South Dearborn Street
Chicago, Illinois

The Kritzer Continuous Lime Hydrator

HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

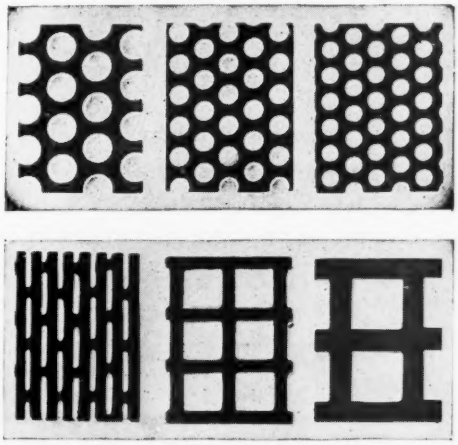
THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

THE KRITZER COMPANY

503 South Jefferson Street CHICAGO, ILL.

Perforated Steel Screens



For Screening Stone, Gravel, Sand and Cement

All sizes and shapes of holes in metal of proper thicknesses to give the best screening results.

Sheets furnished flat or rolled to shape for revolving screens.

THE HARRINGTON & KING PERFORATING CO.

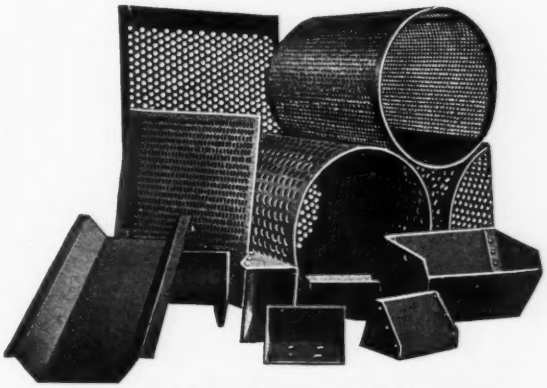
621 N. Union Ave., Chicago, Ill.

NEW YORK OFFICE: 114 Liberty St.

Perforated Metal Screens

FOR

Stone, Gravel, Sand, Etc.



ELEVATOR BUCKETS

PLAIN AND PERFORATED

General Sheet and Light Structural Work

"Light and Heavy Steel Plate Construction"

HENDRICK MFG. CO.

CARBONDALE, PA.

New York Office, 30 Church Street
Pittsburgh Office, 544 Union Arcade Bldg.
Hazleton, Pennsylvania, Office, 705 Markle Bank Bldg.

CROSS ENGINEERING CO. CARBONDALE, PA. CE PERFORATED SHEET METALS

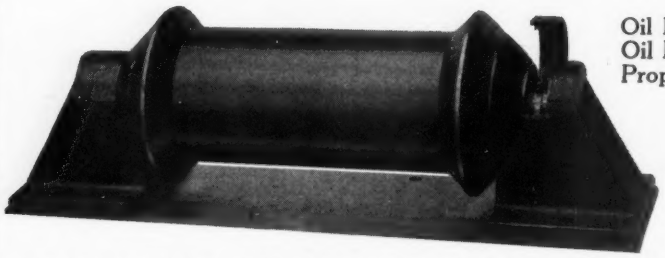
Perforated Steel Screens

The success of any house supplying repair and renewal parts depends on furnishing what is needed quickly and correctly, and of satisfactory quality.

Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

Try us with your next order.

Cross Engineering Company, Offices and Works, Carbondale, Pa.



Oil Reservoirs
Oil Rings Insure
Proper Lubrication

Double Bearing
Durable
Frictionless
Sheaves

ROLLERS AND SHEAVES BUILT FOR SERVICE.
LOW ORIGINAL COST — INSTALLATION — UPKEEP
Send for Descriptive Catalog

CHICAGO MINING SHEAVE AND ROLLER CO.
2320 CHICAGO AVENUE
CHICAGO, ILL.

INTERNATIONAL BARRELS

are without equal for quality, strength and durability

They are the best containers used in the Lime, Cement and Plaster Trades.

Our several branch shops permit quick deliveries of these QUALITY BARRELS to your plant, wherever it is located.

Samples and prices sent on request

International Cooperage Co., Inc.
Niagara Falls, N. Y.

THE GAYCO-EMERICK CENTRIFUGAL AIR SEPARATOR

The first radical improvement in fine separation in a century

A principle which makes obsolete all other separating methods

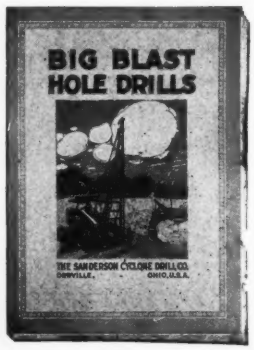
60 mesh to 350 mesh

For limestone, coal, clay, silica, talc, graphite and all other dry ground materials

Increases B. P. L. content of Phosphate Rock

Write for Bulletin C

RUBERT M. GAY COMPANY
114 Liberty St. New York, N. Y.



Analyze Your Drilling and Blasting

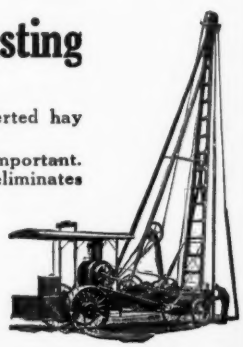
Our new Blast Hole Catalog B-46 (96 pages) will help you.

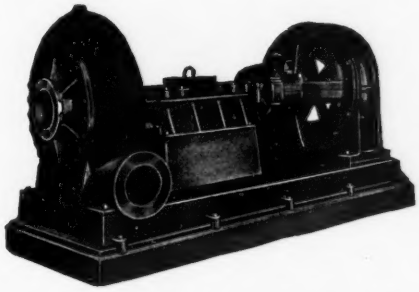
The day of poking a hole down with a rivet header or a converted hay bailer is past.

Drilling, being the first step in stone production, is the most important. One cent or one-half cent per ton cost saved in this operation often eliminates competition.

With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right.

THE SANDERSON-CYCLONE DRILL CO.
Orrville, Ohio
Eastern and Export Office, 30 Church St., New York





Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4" up, arranged for belt, motor, or engine drive.

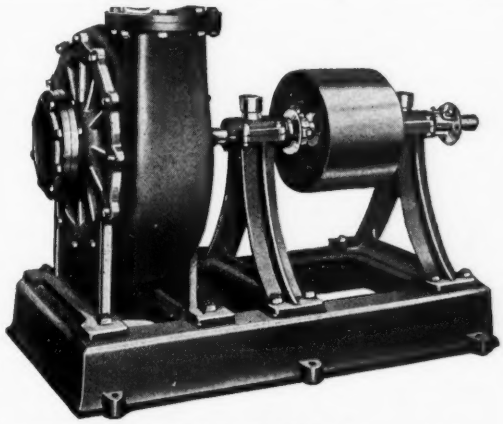
MORRIS MACHINE WORKS
50 Genesee St. Baldwinsville, N. Y.

39 Cortlandt St., New York City
Real Estate Trust Bldg., Philadelphia, Pa.
217 N. Jefferson St., Chicago, Ill.
Penobscot Bldg., Detroit, Mich.

Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

MORRIS

Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines



The LIGHTNING Sand Gravel and Dredging Pump

The durability and integrity of Lightning Sand Pumps, stamp them as the ideal pump for sand companies and contractors.

They are easy to operate, easy to adjust, and easy to replace parts. Shell and Runner made of Semi-steel.

Write for prices and complete information

Kansas City Hay Press & Tractor Co.
Kansas City, Mo.

The HAISS Creeper Loader

The Most Powerful Wagon Loader Made

SELF-PROPELLING
SELF-FEEDING
SELF-CROWDING

Its powerful Creeper Treads take it anywhere—easily and quickly.

Its patented self-feeding propellers keep the material fed to the buckets and clean up *clean*.

Its self-crowding gear keeps the machine nosed into the pile—the buckets must come up full.

Large, well-built buckets dig and carry a full load every revolution.

Convenient control—one man operated. Digs 1½ cu. yds. in 1 minute for 1 cent's worth of power.

It's the loader for the big job work, where the going's rough, and speed and capacity count.

Glad to send a copy of Bulletin No. 521

The George Haiss Mfg. Co., Inc.
139th St. and Park Ave. New York, N. Y.
ESTABLISHED 1892

Representatives throughout the world

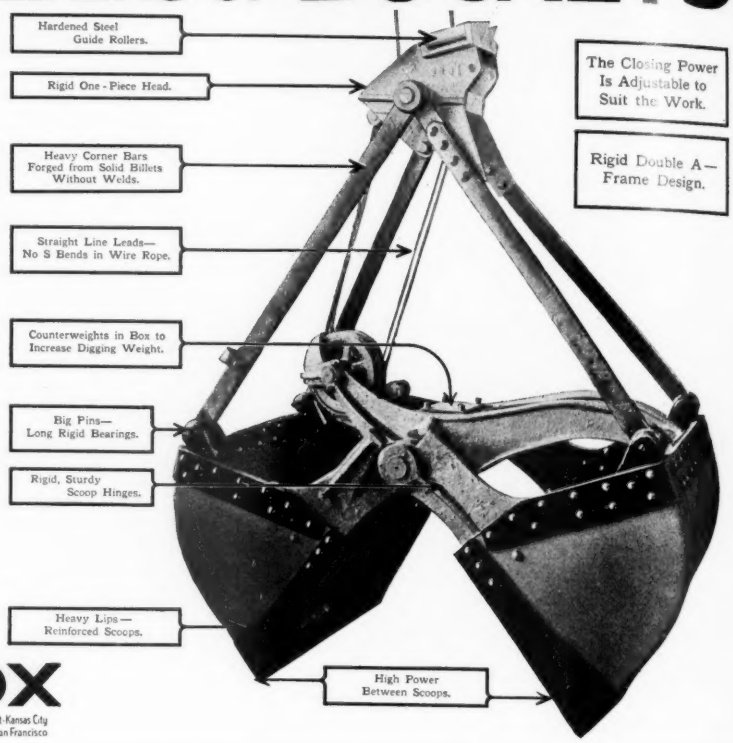
Millars' Timber & Trading Co., London
British Representatives

MASTER BUILDERS of BUCKETS

A BUCKET for every purpose" is the Blaw-Knox Bucket slogan. Standard varieties include single-line, two-line, three-line and four-line clamshells for all work from the lightest rapid rehandling to the most difficult digging and dredging.

Single rope automatic cableways; buckets for handling coal, open hearth slag, sand, stone; dredges for subaqueous work; buckets for digging hard packed clay and other obstinate material; special buckets for the foundry; low head room buckets for the overhead crane.

You specify the rig and the work and we will furnish a bucket to exactly meet requirements.


Hardened Steel Guide Rollers.
Rigid One-Piece Head.
Heavy Corner Bars Forged from Solid Billets Without Welds.
Straight Line Leads—No S Bends in Wire Rope.
Counterweights in Box to Increase Digging Weight.
Big Pins—Long Rigid Bearings.
Rigid, Sturdy Scoop Hinges.
Heavy Lips—Reinforced Scoops.
The Closing Power Is Adjustable to Suit the Work.
Rigid Double A—Frame Design.
High Power Between Scoops.

BLAW KNOX COMPANY
PITTSBURGH, PA. 619 Farmers Bank Bldg.
New York Boston Chicago Detroit Kansas City Baltimore Birmingham San Francisco

Free Service to Readers of
Rock Products

If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, we are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply.

RESEARCH SERVICE DEPARTMENT
ROCK PRODUCTS, 542 So. Dearborn St., Chicago, Illinois

Please send me catalogs and prices concerning the following items:

.....

.....

Name.....

Address.....

City..... State.....

FACING CONCRETE WORK

Middlebury Terrazzo for the facing of all Concrete Products and Stucco Buildings gives the appearance of solid marble with a material saving in price.

This aggregate is made from Middlebury White and Creme Statuary Marbles, making a beautiful and everlasting face, giving the building a distinctive appearance, a richness of finish that can be obtained by no other facing.

This material is furnished, carefully graded to size, in either dust, No. 1, 2 or 3. Write for samples and prices

Middlebury Marble Company
BRANDON, VERMONT

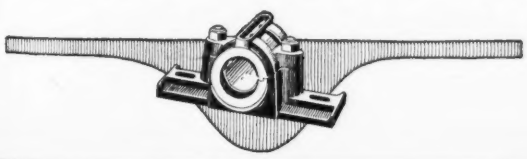
HELICOID CONVEYOR

CONTINUOUS flights (without laps or rivets), and heavier flights on larger pipe, make Caldwell Helicoid Conveyor by far the best on the market. It is the recognized standard conveyor of this type.

The price is no more than for ordinary screw conveyor.

H. W. CALDWELL & SON CO. LINK-BELT COMPANY, OWNER
Dallas, Texas, 709 Main Street—Chicago, 17th Street and Western Ave.—New York, Woolworth Bldg.

CALDWELL



METRO NITE

for Stucco-

Stucco Buildings, Concrete Blocks or Bricks faced with Metro-Nite are beautiful, artistic and everlasting.

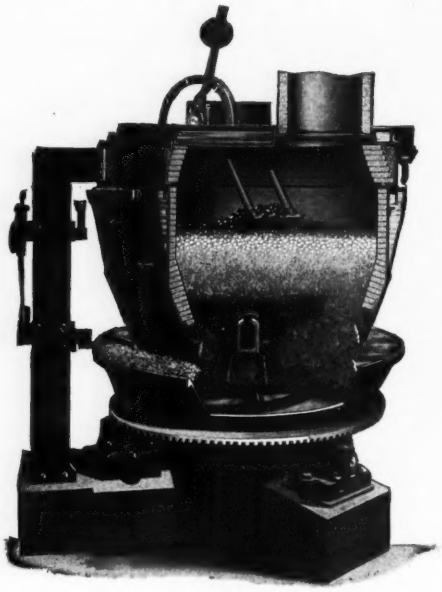
Metro-Nite White is of a crystalline character, really a siliceous dolomite. It is extremely hard, sharp and cleanly graded, making a bright, sparkling face.

Free samples mailed on request.

Two colors—White and Green.

The Metro-Nite Co.
333 Hartford Ave., Milwaukee, Wis.

The Machine of Absolute Satisfaction



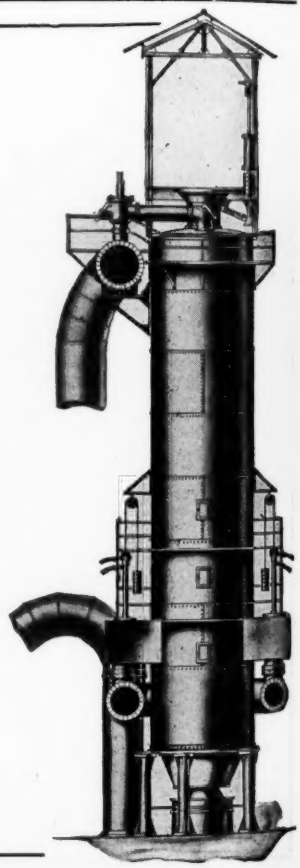
Selected by every large purchaser in the steel industry since the armistice. Three recent installations at leading Eastern Lime Plants.

POKERLESS PRODUCER-GAS MACHINE

Users everywhere testify with one voice to the superior satisfaction and low maintenance expense of this splendid machine. Difference in first cost comes back annually; every detail built for endurance.

MORGAN CONSTRUCTION CO.
Worcester, Mass.
Pittsburgh Office 704 Arrott Bldg. Telephone Court 1381

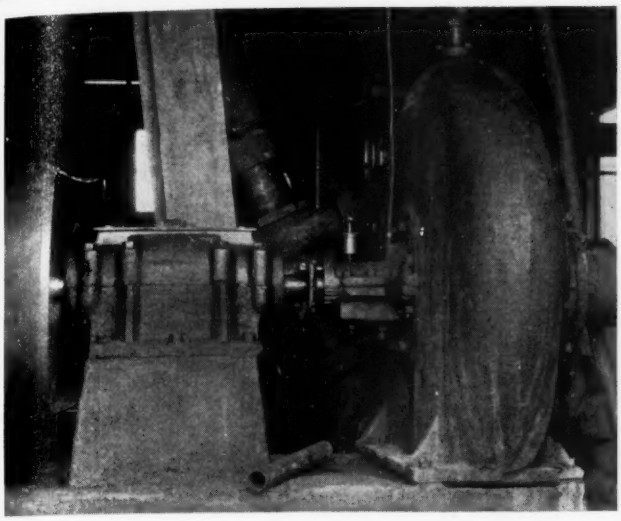
Continuous Discharge—Gas Fired
LIME KILNS



The wastefulness of efficiency of any lime burning apparatus is determined by the amount of fuel per ton of lime produced.

Our Kilns are not an experiment, but have successfully met the test of years of actual service. The design is the work of our Consulting Mechanical and Chemical Engineer, who has had many years of practical operative experience. They embody a number of labor saving devices, and are designed to secure maximum production with minimum fuel consumption; their record in this respect should interest every lime producer in the country.

Glamorgan Pipe & Foundry Company
Lynchburg, Va., U. S. A.
Using the Nationally Famous Virginia Foundry Irons



AMSCO

Demonstrated Economy

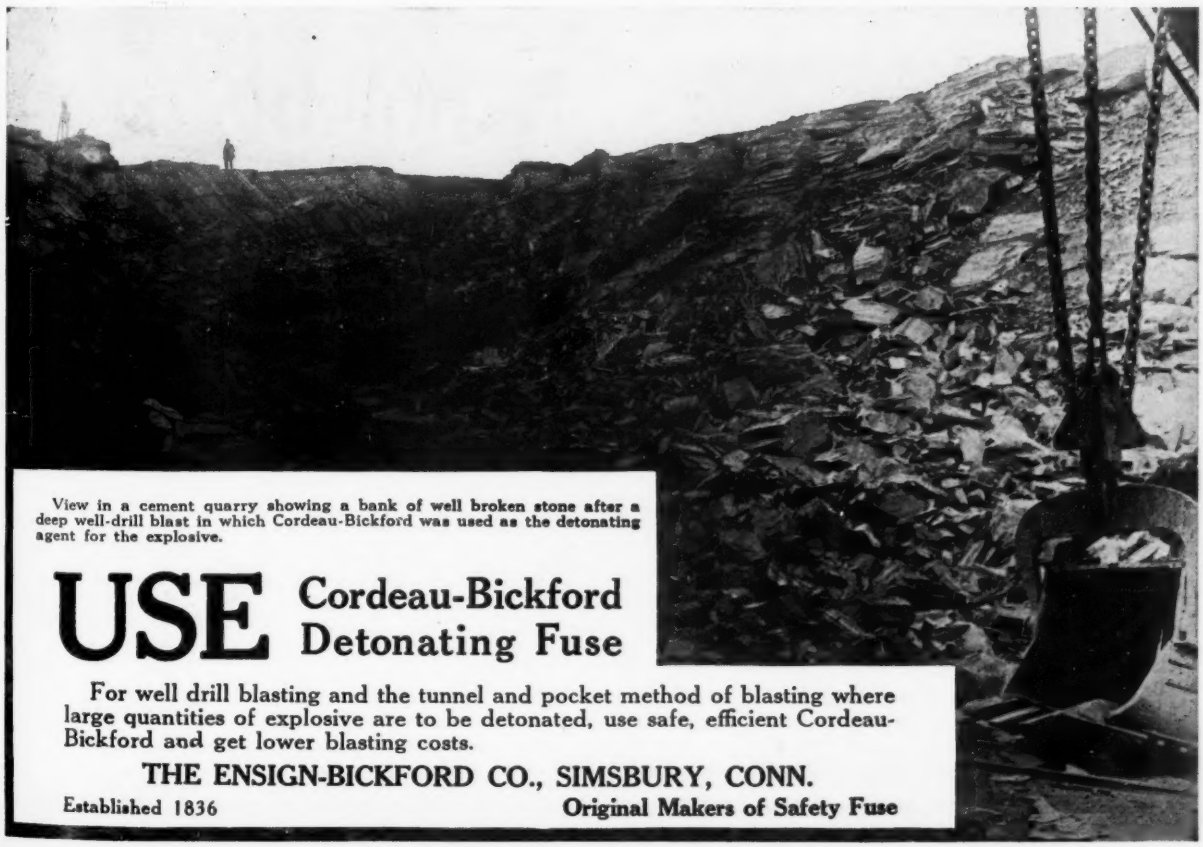
Have you ever figured what it costs you to shut down your pump for repairs during a busy season? Isn't it true that a few days' lost production will cost you more than your whole pump is worth?

The Rogers Park Sand & Gravel Co. knew this when they fitted the pump illustrated above with AMSCO Manganese Steel Wearing Parts. The reliability and economy of AMSCO Steel is demonstrating itself to them day after day and it will do the same for you.

Let us figure now on repairs for your pump

AMERICAN MANGANESE STEEL CO.

Chicago Heights, Illinois



View in a cement quarry showing a bank of well broken stone after a deep well-drill blast in which Cordeau-Bickford was used as the detonating agent for the explosive.

USE Cordeau-Bickford Detonating Fuse

For well drill blasting and the tunnel and pocket method of blasting where large quantities of explosive are to be detonated, use safe, efficient Cordeau-Bickford and get lower blasting costs.

THE ENSIGN-BICKFORD CO., SIMSBURY, CONN.

Established 1836 **Original Makers of Safety Fuse**

PLAMONDON
TRANSMISSION MACHINERY

Dust Proof Friction Clutches—

The continuous friction surfaces of the Plamondon Disc Type Friction Clutch, consists of but three parts, with all the simple mechanism for adjusting and operating on the outside in plain view.

No part is affected by centrifugal action—they can be run at high speed with safety, and without loss of efficiency. The adjustment for wear is made entirely by means of one adjusting collar, which gives a uniform pressure on all parts of the friction surfaces. These surfaces are absolutely dust proof, and are universally used by leading cement mills.

Our products also consist of Heavy Gearing, Cut Gears and Machine Molded Gears of all kinds—Shafting, Pulleys, Hangers, Couplings, Collars, Pillow Blocks, Worm-Wheels, Fly-Wheels, Rope Sheaves, Grey Iron and Semisteel Castings by analysis.

We Solicit Inquiries

A. PLAMONDON MANUFACTURING CO.

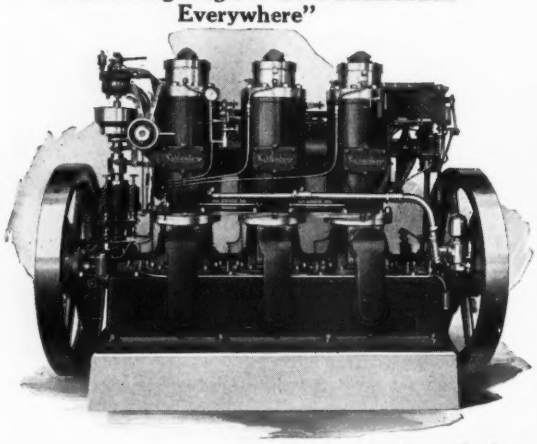
Engineers, Founders, and Machinists

Established 1859 — Incorporated 1877

Works and Main Office: 5301 South Western Boulevard, Chicago, Illinois

EMERGENCY ORDERS RECEIVE SPECIAL ATTENTION

"Kahlenberg Engines Give Satisfaction Everywhere"



Kahlenberg

HEAVY DUTY OIL ENGINES

Sizes 25 to 180 H.P.

Another Owner Writes:

"With reference to our 50-H.P. 2-cylinder oil engine will state that we have been operating this engine since September 10th, 1918, and same has always given us first class service. We recently attempted to take up the bearings, but found that same were in such shape that they would not even stand the removing of a single shim. We find the engine to be very economical in fuel consumption and very satisfactory in every way."

KING'S CROWN PLASTER COMPANY.

Features of the Kahlenberg Oil Engine

Positive governor control from no load to full load. Variable speed instantly obtainable from just turning over to wide open. Operate on fuel oils, kerosene, distillate or other cheap fuels. Fuel consumption .55 pounds per H.P. per hour. **NO WATER INJECTION.**

Kahlenberg engines are very simple and easily operated by any man of ordinary intelligence — no valves to regulate, no high pressure air — automatic regulation and lubrication throughout.

KAHLENBERG BROS. CO.

Manufacturers

1720 12th St., Two Rivers, Wis., U. S. A.

The Wooden Barrel is Superior

THIS organization maintains for your convenience, fifty-one barrel plants and warehouses in all of the states east of the Mississippi River, and owns or controls the output of a large number of stave and heading mills located in the timber districts of the Southwest. Therefore we are prepared to deliver the "Best Barrels Built," made of tongued and grooved staves, glued heading, thoroughly Kiln dried, and bound with wood, wire or steel hoops to meet your requirements.

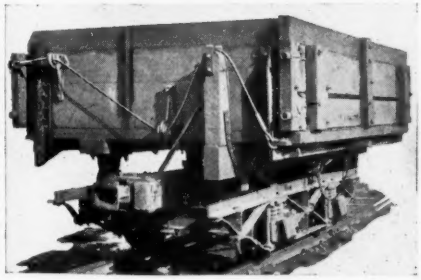
These barrels are practically indestructible, rat, vermin and moisture proof, and meet all the government and railroad requirements for the safe transportation of poisonous substances.

If you are in a hurry, we can supply you.

SANDUSKY COOPERAGE & LUMBER CO., Toledo, Ohio

EASTON *Won-Way* DUMP CAR

STANDARD TYPE NO. 366



Provides increased capacity yet rides the track under all conditions, even without balancing the load. You always have full control of contents, and there is no need to hook to track when dumping to prevent tipping over. Door troubles and interference are eliminated, safety is ensured. Strongly constructed to give utmost service at lowest maintenance.

Easton Won-Way Dump Cars supplied complete or your two-way cars rebuilt on present running gear with steel or wood bodies, giving increased service and a ton greater capacity. Won-Way cars easily, quickly dumped by ram, air-hoist, or friction drum. Write for proposition.

Appearing in these advertisements from time to time are brief illustrated descriptions of certain standard types of the complete line of Easton Quarry Cars. You are invited to correspond with us in regard to your exact requirements and suggest that you write for the 32-page Bulletin, "Quarry Car Practice," which we will gladly forward on request.

28 HOLLEY ST., EASTON, PA.

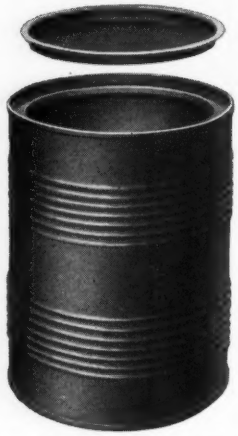
New York Philadelphia Pittsburgh
St. Louis Norfolk Savannah
Birmingham Salt Lake City Los Angeles

EASTON CAR & CONS'T'N CO

2160-E

DMC
Reg. U. S. Pat. Off.

Send it Safely—Ship in Steel



No. 12 Light Shipping Steel Barrel

Serving the Lime Field

For one year we have been offering the lime and cement field the services of the Draper Steel Barrel. Results have so far justified our efforts that we feel impelled to say to every producer that the advent of our steel barrel in this field has marked an epoch in the shipping of rock products.

If you are not using Draper Steel Barrel Service get in touch with our sales department

"What the Shipper Puts In the Customer Takes Out"

THE DRAPER MFG. CO.

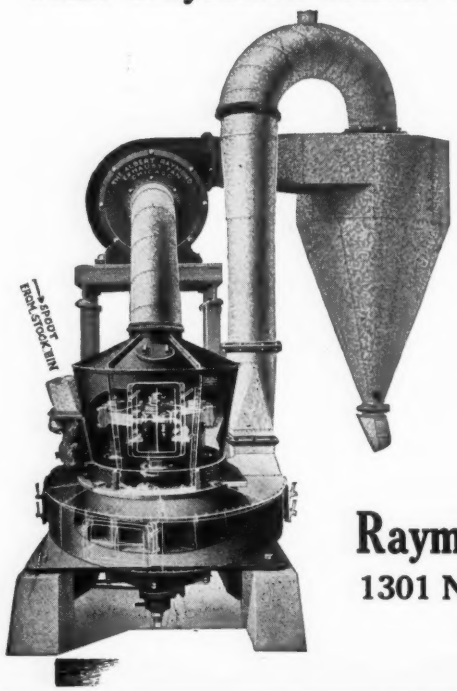
8906 Crane Ave. **Cleveland, Ohio**

District Sales Offices:

New Orleans, La.—203 Pan-American Bldg.; E. J. Putzell, Dist. Sales Mgr.
New York—110 William St.; C. B. Peters Co., Inc., Eastern Sales Representative
Chicago, Ill.—128 N. Wells St.; Amco Sales Corporation.
San Francisco, Cal.—16 California St.; The Hale Co.

Our No. 9 Catalogue Just Fits Your Pocket

Two More Cement Plants Have Found From Experience That Raymond Roller Mills Grind Their Coal Economically



One has replaced tube mills with Raymond Roller Mills reducing, very materially, their power and repairs and producing a more uniform coal which has enabled them to better the control of their kilns and increase their production.

The other has replaced another type of pulverizer with the efficient Raymond Roller Mill, obtaining finer and more uniform coal which has enabled them to obtain the same production from 19 kilns, where formerly the operation of 20 was necessary.

Let us make you a proposition

Raymond Bros. Impact Pulverizer Company

1301 North Branch Street **Chicago, Ill.**

Western Office: 1002 Washington Bldg., Los Angeles, Calif.
Eastern Office: 50 Church St., New York City

TELSMITH GRAVEL WASHING PLANTS

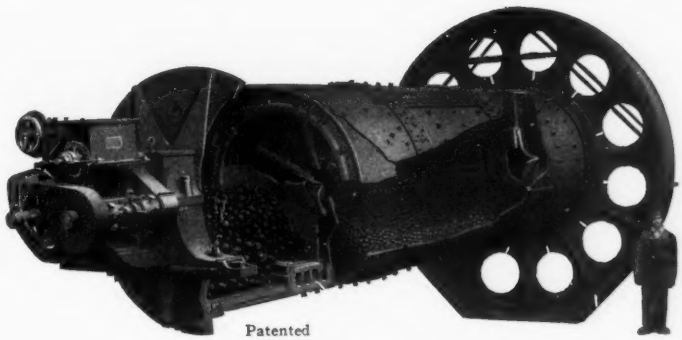
Have you seen a Telsmith plant work? If not, take a look at one of these outfits: Parma Sand & Gravel Co., Cleveland, Ohio; Wm. H. Ritzert, Naperville, Ill.; H. W. Horst Co., Rock Island, Ill.; Fay Sand and Gravel Co., Chisholm, Minn.; Woodbury County Gravel Pit, Correctionville, Ia.; Robbins-Young Co., New London, Minn.; A. H. Prange, Grand Rapids, Mich.; Crystal Lake Crushed Stone Co., Sheboygan, Wis.; Salem Sand & Gravel Co., Wilkes-Barre, Pa.; Crawford Sand & Gravel Co., Meadville, Pa.

These plants were designed by Telsmith engineers; and are equipped throughout with Telsmith machinery—Telsmith crushers, Telsmith bucket elevators, Telsmith belt conveyors, washing screens, feeders, sand tanks, bin gates. In each case, the buyer got a well designed plant, suited to his local conditions, with all elements in good balance and properly "hitched up."

The list is only a short one. A complete list of Telsmith installations would resemble a husky young directory. We'd like to add your name to our roster of successful Telsmith installations. Just drop us a line and we'll send you our general bulletin G. P. 11.

SMITH ENGINEERING WORKS

3188 Locust Street, Milwaukee, Wis.



Patented

If you have any grinding problems, the Compeb Mill should receive thorough consideration. This mill, designed to reduce any grindable material, either wet or dry, from sizes 1½" and under to any commercial fineness.

USE THE COMPEB MILL

TO REDUCE GRINDING COSTS

ALLIS-CHALMERS MANUFACTURING CO.

MILWAUKEE, WIS. U.S.A.

Buyers' Directory
of the Rock Products Industry
Classified Directory of Advertisers in Rock Products

AERIAL TRAMWAYS
Interstate Equip. Co., New York, N. Y.

AIR COMPRESSORS
Bury Compressor Co., Erie, Pa.

AUTOMATIC WEIGHERS
Schaffer Eng. & Equipment Co., Pittsburgh, Pa.

BAGS AND BAG MACHINERY
Bates Valve Bag Co., Chicago, Ill.
Jaite Co., The, Jaite, Ohio.
Valve Bag Co. of America, Toledo, Ohio.

BARRELS—Lime
Draper Mfg. Co., The, Cleveland, Ohio.
International Cooperage Co., Niagara Falls, N. Y.
Sandusky Cooperage & Lbr. Co., Toledo, Ohio.

BARREL MAKING MACHINERY
The D. H. Stoll Co., Buffalo, N. Y.

BELTING
New York Belting & Packing Co., New York, N. Y.

BINS
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Neff & Fry, Camden, Ohio (concrete stone)
Weller Mfg. Co., Chicago, Ill. (storage)

BIN GATES
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bacon, Earle C., Inc., New York City.
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

BLASTING SUPPLIES
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

BOILERS, WASTE, HEAT
Edge Moor Iron Co., Edge Moor, Del.
Freeman Mfg. Co., Racine, Wis.

BRICK MACHINERY
Besser Sales Co., Chicago, Ill.
Shope Brick Co., Portland, Ore.

BUCKETS—Elevator
Brown Hoisting Machinery Co., Cleveland, O.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., Columbus, O.
Orton & Steinbrenner, Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

BUCKETS
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
McMyler Interstate Co., Cleveland, Ohio.
Owen Bucket Co., Cleveland, Ohio.

CABLEWAYS
Blaw-Knox Co., Pittsburgh, Pa.
S. Flory Mfg. Co., Bangor, Pa.
Interstate Equip. Co., New York, N. Y.

CALCINING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Butterworth & Lowe, Grand Rapids, Mich.
Ehrsam & Sons Co., J. B., Enterprise, Kans.

CARS—Quarry and Industrial
Atlas Car & Mfg. Co., Cleveland, Ohio.
Easton Car & Constr. Co., Easton, Pa.
Kilbourne & Jacobs Mfg. Co., Columbus, O.
Watt Mining Car Wheel Co., Barnesville, Ohio

CAR PULLERS
Weller Mfg. Co., Chicago, Ill.

CEMENT MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Eng. Corp., N. Y. City.

CEMENT MILL REPAIRS
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

CLUTCHES
Webster Mfg. Co., Chicago, Ill.

COMPRESSORS, AIR
Ingersoll-Rand Co., N. Y. City.

CONVEYORS AND ELEVATORS
Caldwell, H. W., & Son Co., Chicago, Ill.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
Jeffrey Mfg. Co. The, Columbus, Ohio.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Robins Conveying Belt Co., New York City.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Chicago, Ill.

CRANES—Locomotive Gantry
Ball Engine Co., Erie, Pa.
Brown Hoisting Machinery Co., The, Cleveland, Ohio.
Byers Mach. Co., The, Ravenna, Ohio.
Erie Steam Shovel Co., Erie, Pa.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., The, Marion, Ohio.

CRUSHERS AND PULVERIZERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulverizer Co., St. Louis, Mo.
Austin Mfg. Co., Chicago, Ill.
Bacon, Earle C., Inc., New York, N. Y.
Buchanan Co., Inc., C. G., New York, N. Y.
Butterworth & Lowe, Grand Rapids, Mich.
Gruendler Pat. Crusher Co., St. Louis, Mo.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Kaltenthaler, H. J., Philadelphia, Pa.
K. B. Pulverizer Co., New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y.
Kent Mill Co., Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Munson Mill Machinery Co., Utica, N. Y.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Smidth & Co., F. L., New York, N. Y.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.
Williams Pat. Crush. & Pulv. Co., Chicago, Ill.

CRUSHER REPAIRS—Manganese Steel
American Manganese Steel Co., Chicago Heights, Ill.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

CLUTCHES
Weller Mfg. Co., Chicago, Ill.

DERRICKS
Terry Mfg. Co., New York, N. Y.

DIPPER TEETH
American Manganese Steel Co., Chicago Heights, Ill.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

DREDGING MACHINERY
S. Flory Mfg. Co., Bangor, Pa.

DRILLS
Armstrong Mfg. Co., Waterloo, Iowa.
The Loomis Machine Co., Tiffin, Ohio.
Sanderson Cyclone Drill Co., Orrville, Ohio.

DRILLERS
Pennsylvania Drilling Co., Pittsburgh, Pa.

DRYERS
American Process Co., New York City.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

DUST COLLECTING SYSTEMS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DYNAMITE
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

ENGINES—Steam
Morris Mach. Works, Baldwinsville, N. Y.

ENGINES—Oil
Kahlenberg Bros. Co., Two Rivers, Wis.

ENGINEERS
Artingstall, S. G., Jr., Chicago, Ill.
Bacon, Earle C., Inc., New York, N. Y.
Buckbee Co., J. C., Chicago, Ill.
Crow, Waller, Inc., Chicago, Ill.
Ehrsam & Sons Co., J. B., Enterprise, Kans.
James N. Hatch, Chicago, Ill.
R. W. Hunt & Co., Chicago, Ill.
Randolph-Perkins Co., Chicago, Ill.
Smidth & Co., F. L., New York, N. Y.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Waller Crow, Inc., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

EXCAVATORS
Ball Engine Co., Erie, Pa.
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Erie Steam Shovel Co., Erie, Pa.
Owen Bucket Co., Cleveland, Ohio.

EXCAVATORS—Dragline Cableway
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

EXPLOSIVES
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

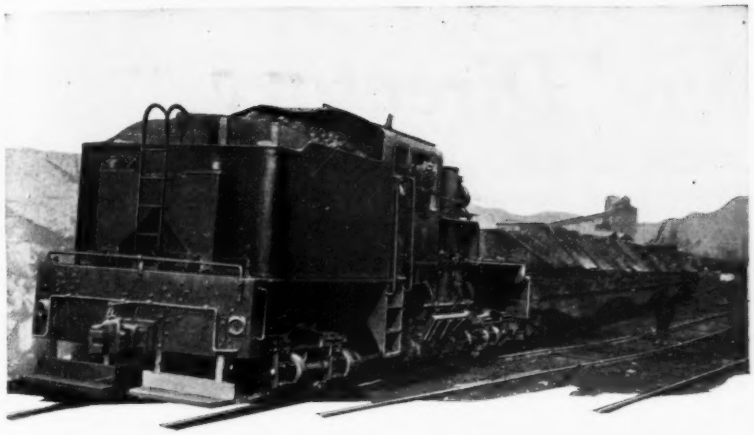
FUSES
Ensign-Bickford Co., Simsbury, Conn.

GAS PRODUCERS
Morgan Construction Co., Worcester, Mass.

GEARS
Caldwell, H. W., & Son Co., Chicago, Ill.
Plamondon Mfg. Co., Chicago, Ill.

GENERATORS
Burke Electric Co., Erie, Pa.

(Continued on page 68)



Don't impair the operating efficiency of your Shays by using inferior repair parts. Order your parts direct from Lima.

How to Get a Repair Part for a Shay

THE best and quickest way to get a spare part or a repair part for a Shay Geared Locomotive is to order it from the Shay builder, the Lima Locomotive Works, Incorporated.

Lima always has a large stock of duplicate parts for all standard Shays. Letter and telegraphic orders are given immediate attention and shipped promptly.

Only a regular, duplicate Shay part can be depended on to work properly in a Shay Geared Locomotive.

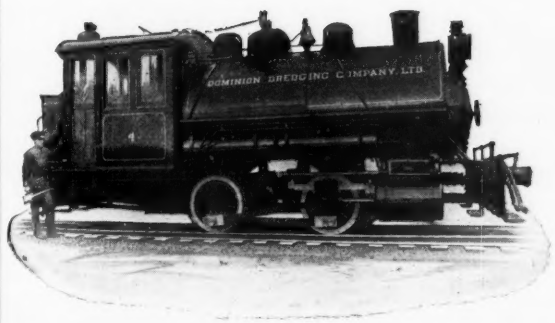
Do not impair the efficiency of your Shay by using less satisfactory parts obtained from other sources.

LIMA LOCOMOTIVE WORKS, Incorporated

17 East 42nd Street, New York Lima, Ohio

Always on Top

VULCAN LOCOMOTIVES



Contractors have no trouble in coming out "on top" when Vulcan Locomotives are used. Not only are you sure of avoiding loss due to haulage delays, but the reserve power and the design of Vulcan Locomotives enable you to improve on your estimated haulage time. No matter in what class of work you specialize, there is a Vulcan Locomotive that will fit your requirements. Tell us what they are and let us submit details.

VULCAN IRON WORKS

ESTABLISHED 1849

1739 Main Street WILKES-BARRE, PA.

Buyers' Directory
of the Rock Products Industry
Classified Directory of Advertisers in Rock Products

(Continued from page 66)

GLASS SAND EQUIPMENT
Lewistown Fdy. & Mach. Co., Lewistown, Pa.

GRATES
The Kramer Bros. Fdy. Co., Dayton, Ohio.

GRINDING MILLS
Munson Mill Machinery Co., Utica, N. Y.

HOISTS
Flory Mfg. Co., S., Bangor, Pa.
J. S. Mundy Hoisting Engine Co., Newark, N. J.
Ottumwa Iron Works, Ottumwa, Iowa.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

HOSE—Water, Steam, Air Drill, Pneumatic Tool
Ingersoll-Rand Co., New York City.
N. Y. Belting & Packing Co., New York, N. Y.

HYDRATING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Kritzer Co., The, Chicago, Ill.
Miscampbell, H., Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Toepfer & Sons Co., W., Milwaukee, Wis.

HYDRAULIC DREDGES
Morris Machine Works, Baldwinsville, N. Y.

LIME HANDLING EQUIPMENT
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

LIME KILNS
Blaw-Knox Co., Pittsburgh, Pa.
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Vulcan Iron Works, Wilkes-Barre, Pa.

LOADERS AND UNLOADERS
Ball Engine Co., Erie, Pa.
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Erie Steam Shovel Co., Erie, Pa.
Haiss Mfg. Co., The Geo., New York City.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Orton & Steinbrenner, Chicago, Ill.

LOCOMOTIVES
Baldwin Locomotive Works, The, Philadelphia, Pa
Brookville Truck & Tractor Co., Brookville, Pa.
Fate-Root-Heath Co., Plymouth, Ohio.
Hadfield-Penfield Steel Co., Bucyrus, Ohio.
Industrial Equip. Co., Minster, Ohio.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Lima Locomotive Works, New York, N. Y.
Vulcan Iron Works, Wilkes-Barre, Pa.
Whitcomb Co., Geo. D., Rochelle, Ill.

MOTORS, ELECTRIC
Burke Electric Co., Erie, Pa.

MOTOR TRUCKS
Packard Motor Car Co., Detroit, Mich.
Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

PACKING—Sheet, Piston, Superheat, Hydraulic
N. Y. Belting & Packing Co., New York, N. Y.

PAINT AND COATINGS
Williams, C. K., & Co., Easton, Pa.

PERFORATED METALS
Chicago Perforating Co., Chicago, Ill.
Cross Eng. Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.

PLASTER MACHINERY
Butterworth & Lowe, Grand Rapids, Mich.
Ehrsam & Sons Co., J. B., Enterprise, Kans.

PORTABLE CONVEYORS
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.

POWDER
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

POWER TRANSMITTING MACHINERY
Caldwell, H. W., & Son Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Manganese Steel Co., Chicago Heights, Ill.
K. C. Hay Press & Tractor Co., Kansas City, Mo.
Morris Machine Works, Baldwinsville, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

PULLEYS
Weller Mfg. Co., Chicago, Ill.

PULVERIZED FUEL EQUIPMENT
Raymond Bros. Impact Pulv. Co., Chicago, Ill.

PUMP VALVES
N. Y. Belting & Packing Co., New York, N. Y.

QUARRY EQUIPMENT
Universal Road Mach. Co., Kingston, N. Y.

ROPE, WIRE
American Steel & Wire Co., Chicago, Ill.
Leschen, A., & Sons Co., St. Louis, Mo.

SCALES
Richardson Scale Co., Passaic, N. J.

SCRAPERS, DRAG
Sauerman Bros., Chicago, Ill.

SCREENS
Chicago Perf. Co., Chicago, Ill.
Cross Eng. Co., Carbondale, Pa.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
Hendrick Mfg. Co., Carbondale, Pa.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Tyler Co., The, W. S., Cleveland, Ohio.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

SEPARATORS
Rubert M. Gay Co., New York City.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Tyler Co., The W. S., Cleveland, Ohio.

SEPARATORS, MAGNETIC
Buchanan Co., C. G., Inc., New York, N. Y.

SHEAVES
Chicago Mining Sheave & Roller Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

SHOVELS—Steam and Electric
Ball Engine Co., Erie, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Bucyrus Co., South Milwaukee, Wis.
Erie Steam Shovel Co., Erie, Pa.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., The, Marion, Ohio.

SHOVEL REPAIRS—Steam and Electric
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

SLATE WORKING MACHINERY
S. Flory Mfg. Co., Bangor, Pa.

SPROCKETS
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

SPROCKET CHAIN
Webster Mfg. Co., Chicago, Ill.

STEEL PLATE CONSTRUCTION
Blaw-Knox Co., Pittsburgh, Pa.
Hendrick Mfg. Co., Carbondale, Pa.

STORAGE BINS
Blaw-Knox Co., Pittsburgh, Pa.
Brown Hoisting Machinery Co., Cleveland, O.
Neff & Fry, Camden, Ohio

STUCCO FACINGS
Metro-Nite Co., Milwaukee, Wis.
Middlebury Marble Co., Brandon, Vt.
Vermont Milling Products Co., Fair Haven, Vt.

SWITCHES AND FROGS
Central Frog & Switch Co., Cincinnati, Ohio.
Easton Car & Constr. Co., Easton, Pa.

TANKS, STEEL STORAGE
The Blaw-Knox Co., Pittsburgh, Pa.
Traylor Eng. & Mfg. Co., Allentown, Pa.

TESTING SIEVES AND TESTING SIEVE SHAKERS
Tyler Co., The W. S., Cleveland, Ohio.

TRAMWAYS
Interstate Equip. Co., New York, N. Y.

TRANSFORMERS
Burke Electric Co., Erie, Pa.

TRANSMISSION MACHINERY
Plamondon Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago Ill.

WASHERS, SAND AND GRAVEL
Link Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.

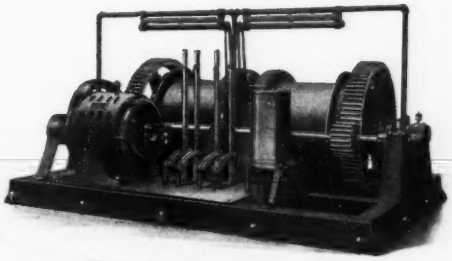
WEIGHING EQUIPMENT
Richardson Scale Co., Passaic, N. J.

WELDING EQUIPMENT
Burke Electric Co., Erie, Pa.
Oxweld Acetylene Co., Newark, N. J.

WHEELS, AXLES AND JOURNAL BOXES
Easton Car & Constr. Co., Easton, Pa.

WIRE ROPE
American Steel & Wire Co., Chicago, Ill.
Leschen, A., & Sons Co., St. Louis, Mo.
Williamsport Wire Rope Co., Williamsport, Pa.

WIRE CLOTH
Cleveland Wire Cloth Co., Cleveland, Ohio.
Tyler Co., The W. S., Cleveland, Ohio.



OTTUMWA HOISTS

We manufacture hoists that are unique in their accomplishments, and make rapid hoisting easy and economical; but our real service to the rock products industry is the corps of competent and experienced engineers we maintain to aid our customers in properly applying machinery for the best results.

Our engineers will advise the best procedure to meet your requirements, and if these suggestions do not meet your approval, you will be under no obligation.

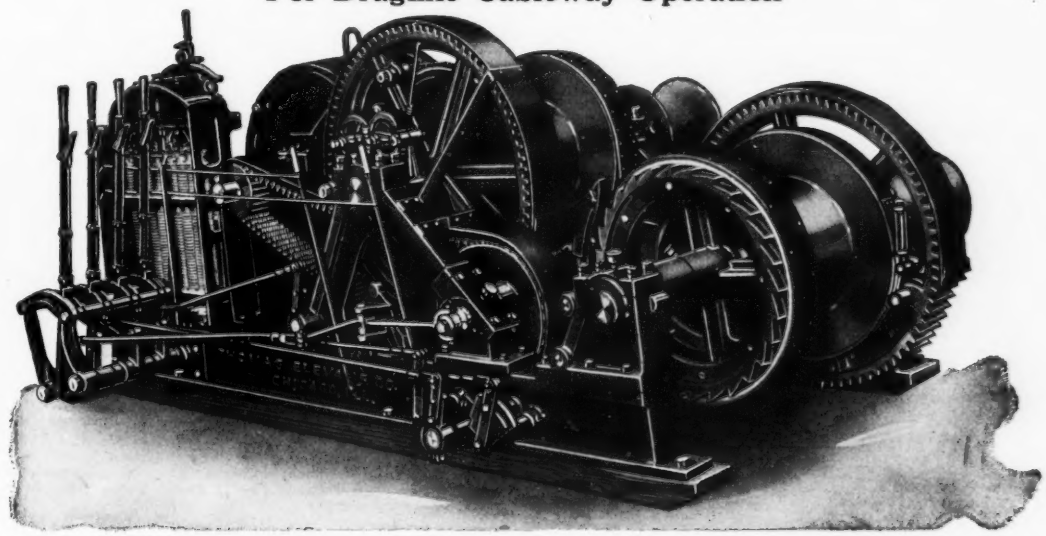
The above engraving illustrates our tail rope hoist, used where excessive grades and other conditions preclude the use of locomotives.

Ottumwa Patent Roller Bearing Wheel Trucks for your cars in quarry or pit, mean a long time service of real saving in oil and power.

Ottumwa Iron Works, Ottumwa, Ia., U.S.A.

THOMAS TWO SPEED HOISTS

For Dragline Cableway Operation



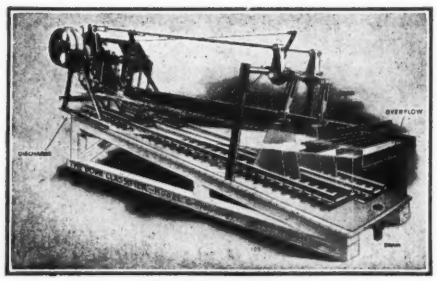
THOMAS ELEVATOR COMPANY

27 South Hoyne Avenue **Chicago, Ill.**

DORR

Washing

Sand and Gravel
Phosphate Rock
Clay and Talc
English Chalk
Limestone
Ochre



THE DORR CLASSIFIER

Continuous, automatic production.

Cleaner, more evenly graded products with less waste and at lower operating costs.

Separation at any point from 20 to 350 mesh.

Low power consumption. Practically no attendance or upkeep. Requires no re-arrangement of present plant.

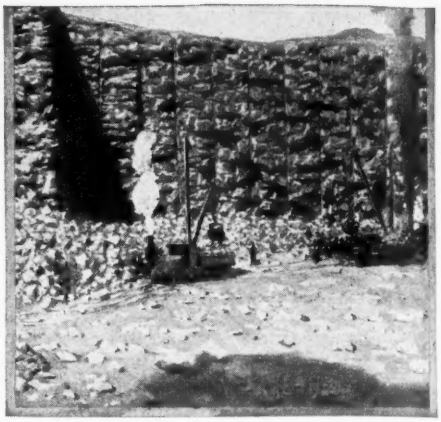
Write us for details as applied to ***your*** operation.

The Dorr Company
Engineers

101 Park Avenue
Denver New York London, E. C.

RESEARCH TESTS DESIGN EQUIPMENT

ATLAS EXPLOSIVES
USED ON BIG JOBS EVERYWHERE



The blaster who uses Atlas Non-Freezing is not only SAVED the inconvenience of thawing required when ordinary explosives are used in freezing weather, but he also is IMMUNE from the headache tortures that result from handling large quantities of the ordinary forms of high explosives. Tell us what explosive you now are using and we will tell you what grade of Atlas Non-Freezing will do YOUR work.

ATLAS POWDER COMPANY
WILMINGTON, DEL.

Branch Offices:—Allentown, Pa.; Birmingham, Ala.; Boston; Chicago; Houghton, Mich.; Joplin, Mo.; Kansas City; Knoxville; McAlester, Okla.; Mexico City, Mexico; New Orleans; New York; Philadelphia; Pittsburg, Kan.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis; Wilkes-Barre.

A PROPER EXPLOSIVE FOR EVERY BLASTING REQUIREMENT

INDEX TO ADVERTISEMENTS

Allis-Chalmers Mfg. Co. 65
American Manganese Steel Co. 61
American Process Co. Inside back cover
American Pulverizer Co. 53
Armstrong Mfg. Co. Front cover
Atlas Powder Co. 70

Bacon, Earle C., Inc. 51
Baldwin Locomotive Works 51
Blaw-Knox Co. 58
Besser Sales Co. 9
Buchanan Co., C. G. 51
Bucyrus Co. 7
Burke Electric Co. 49
Buyers' Directory 66-68
Byers Machine Co., The 49

Caldwell & Son Co., H. W. 59
Central Frog & Switch Co. 49
Chicago Mining Sheave & Roller Co. 56
Chicago Perforating Co. 50
Classified Advertising 48
Cook's Sons Co., Adam 46
Cross Eng. Co. 55
Crow, Waller, Inc. 10

Davis, J. F. 47
Dorr Co., The 70
Draper Mfg. Co., The 64
Du Pont de Nemours & Co. 5

Edge Moor Iron Works 72
Easton Car & Constr. Co. 63
Ehrsam & Sons Co., J. B. 46
Ensign-Bickford Co. 61
Erie Steam Shovel Co. 53

Flory Mfg. Co., S. 50
Fate-Root-Heath Co. 12

Gay Co., Rubert M. 56
Glamorgan Pipe & Fdry. Co. 60

Harrington & King Perf. Co. 55
Hadfield-Penfield Steel Co. 54
Haiss Mfg. Co., The Geo. 57
Hendrick Mfg. Co. 55
Hercules Powder Co. 4
Hunt, R. W., & Co. 46

Industrial Equip. Co. 51
International Cooperage Co. 56
Interstate Equip. Co. 49

Jaite Co., The Inside back cover

Kaltenthaler, H. J. 52
Kahlenberg Bros. Co. 62
Kansas City Hay Press & Tractor Co. 57
K-B Pulverizer Co., Inc. 53
Kilbourne & Jacobs Mfg. Co. 11
Kritzer Co., The 55

Leschen & Sons Rope Co., A. Inside back cover
Lewistown Fdy. & Mach. Co. 51
Lima Locomotive Works 67
Link-Belt Co. 6

McLanahan-Stone Machine Co. 52
McMyler Interstate Co. 49
Metro-Nite Co. 59
Middlebury Marble Co. 59
Miscampbell, H. 54
Morgan Construction Co. 60

Morris Mach. Co. 57
Mundy Hoisting Engine Co., J. S. 50

New York Belting & Packing Co. 1

Ohio Locomotive Crane Co. 49
Orton & Steinbrenner 49
Osgood Co., The 53
Ottumwa Iron Works 69

Pennsylvania Crusher Co. 51
Plamondon Mfg. Co., A. 62
Pierce-Arrow Motor Car Co. 54

Raymond Bros. Impact Pulv. Co. 64
Robins Conveying Belt Co. 51

Sanderson Cyclone Drill Co. 56
Sandusky Cooperage & Lumber Co. 63
Sauerman Bros. 50
Smith Eng. Works 65
Shope Brick Co. 8
Smidth & Co., F. L. 46
Sturtevant Mill Co. 50

Terry Mfg. Co. 50
Thomas Elevator Co. 69
Toepfer & Sons Co., W. 50
Traylor Eng. & Mfg. Co. 3

Universal Crusher Co. 52
Universal Road Mach. Co. 52
Used Equipment 47-48

Valve Bag Co. of America Back cover
Vulcan Iron Works 67

Watt Mining Car Wheel Co. 49
Weller Mfg. Co. Inside back cover
Whitcomb Co., Geo. D. Inside front cover

IDEAS—

You could use an idea now and then, couldn't you?
You'll find plenty of new ones, short cuts and time savers in ROCK PRODUCTS.

Our traveling editors are running around, dropping in here and there finding out just how things are done, and then they tell you how the other fellow makes things hum.

Practical stuff—tested ideas—something *you* can use
Better fill out the blank and mail it to us today

ROCK PRODUCTS Date.....1922
542 So. Dearborn St., Chicago, Ill.

Please enter my subscription to ROCK PRODUCTS for.....year.... (one year $2.00, two years $3.00—please state which. You save a dollar by subscribing for two years), for which we enclose $..... Canadian and Foreign Subscriptions $3.00 a year.

Name.....

Street.....

City.....State.....

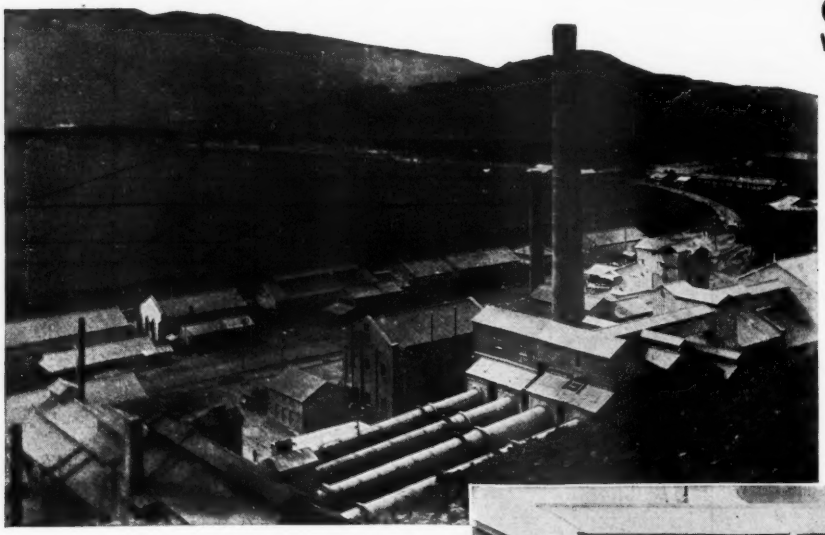
We produce:.....

.....

.....

We retail.....

350 lbs. Steam from Each 100 lbs. Coal SAVED



Plant of Hokoku Cement Company, Karita, Japan, equipped with Edge Moor Waste Heat System consisting of two 747 H. P. boilers and special auxiliary equipment.

Partial view of Edge Moor Waste Heat System at Hokoku plant, showing flue, boiler and economizer.

HERE'S a concrete example of the savings effected by the EDGE MOOR WASTE HEAT SYSTEM:

In an efficiently operated dry-process kiln, burning 13,500 B. T. U. coal, about 1400 lbs. of gas are produced per 100 lbs. of coal burned. The temperature of this gas when it leaves the kiln is about 1500 degs. F.

To reduce the gas temperature from 1500 degs. F. to 350 degs. F. with an allowance of 40% air leakage and mean specific heat of gas at 0.26, means the recovery of about 379,000 B. T. U. for each 100 lbs. of coal burned—over 28% of the original B. T. U. content, otherwise absolutely wasted.

Under average conditions, this heat recovery per 100 lbs. of coal will yield 350 lbs. of steam —at no additional cost for fuel.

Usually, the waste heat recovered by the Edge Moor System is sufficient to carry the entire power load of the plant. Savings of 30% to 40% of the total fuel consumption of the plant have been realized by the installation of waste heat equipment and the shutting down of direct fired boiler plants. As a result, the waste heat system pays for itself in one to two years.

Details of design and construction, with further figures of economies effected, are contained in the Edge Moor catalogue. Tell us where to send your copy.

EDGE MOOR IRON COMPANY

New York Chicago St. Paul — *Established 1868* EDGE MOOR, DELAWARE — *Boston Pittsburgh Charlotte*

EDGE MOOR Water Tube BOILERS

FOR INCREASED FUEL ECONOMY

Announcing—

an engineering triumph

A simpler, more powerful gas shovel combined with *Northwest* mobility—

HERE is the ***final*** achievement in shovel building—a gas shovel that puts a punch in every movement; that will give 15 to 25 per cent greater output than any shovel with the same size dipper; that is far simpler, more ruggedly built, and therefore better fitted to withstand the heavy shocks of continuous shoveling.

New—but thoroughly tested

Years of experimenting and a long period of exhaustive and drastic tests, conducted on the job by practical men, have proved out every detail of the design and construction of this sturdy shovel. Its design is revolutionary. The complications of other shovels—the short lived gears, racks, pinions, crowding engines, and other auxiliaries are eliminated.

These complications are replaced by a simple, ingenious arrangement of lines that makes the full power of the 50 H.P. engine available for crowding as well as hoisting. Practical men who have seen the Northwest in action say that it has the greatest power at the dipper lip of any shovel ever built—and in a shovel that's where power counts!

Consider the fact that this fast, powerful shovel is attached to the crawler mechanism that has made the Northwest Crane famous for ability to "go anywhere," and you will know why without hesitancy we announce it as an ***engineering triumph.***

The Northwest Shovel mechanism may be attached to any Northwest Crawler Crane or Dragline without making any change in the machine itself. The boom can be replaced by the shovel or the shovel replaced by the boom in less than three hours. Note the specifications opposite. Ask for interesting description of the novel dipper construction.

SPECIFICATIONS:

Dipper capacity ¾ cu. yd. 15 to 25% greater capacity.
Reversible manganese teeth.
Will dig 30 ft. flat width —4 ft. below grade.
Northwest Patented Steering Method.
Loads on one flat car—no dismantling for shipment.
Greater back reach.

Northwest Engineering Co.
Works: Green Bay, Wisconsin
General Sales Offices:
28 E. Jackson Blvd., Chicago

NORTHWEST GAS SHOVEL

When writing advertisers please mention ROCK PRODUCTS